NATURE MAGAZINE

OCTOBER 1924

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THE TREE PLANTING ARMY

Celebrate the Centennial of Arbor Day in 1972 by planting the trees now.
—Charles Lathrop Pack, President, American Tree Association.

All the girls at Wyoda Camp, South Fairlee, Vt., have joined the tree-planting army, the registrations being made by Mr. and Mrs. Harvey Newcomer, directors of the camp.

On the Mesaba Range in Minnesota the Rotary and Lions Clubs have united on a highway tree-planting program. Mayor John M. Gannon, of Hibbing, directs the work in his section.

Fifty more tree planters from Chicago Boy Scouts have registered following their tree planting at Owasippe Camp in Michigan at the direction of C. A. Edson, Field Scout Executive.

At Forest Vale Camp, Franklin, N. H., sixteen girls have joined the tree-planting army at the direction of Ethel B. Mayall.

The Rotary Club of Newberry, S. C., has plans under way for planting a memorial drive. Lombardy Poplar or the pecan will be used.

The Chamber of Commerce of Burlington, N. J., is taking up plans for tree planting.

At Towson, Md., the Maryland Branch of the Parent-Teachers Association planted an oak tree, the symbol of the organization. The tree was placed in front of Miller's Hall at the State Normal School.

At the direction of Mrs. Frank Hummel, chairman of conservation of the Daughters of the American Revolution of Iowa, a tree-planting program as outlined by the American Tree Association is being put before the eighty-eight chapters of the state.

The National First Aid Association is reporting memorial tree planting in various parts of the United States. A tree was planted for Clara Barton at Medford, during the G. A. R. Encampment in Boston, by the W. R. C. Other trees for Clara Barton have been placed by Rhode Island W. R. C. at Providence, and at Seattle, Wash., by Alice French, past president of the W. R. C., under the auspices of the Washington and Alaska departments. During the Boston encampment 48 trees were placed in Grand Army Row on Boston Common.

At the state convention of the Elks at Bellingham, Wash., resolutions urging the planting of memorial trees were adopted. The New Jersey Elks have placed many trees during the past year.

Thomas C. Luther, of Saratoga Springs, N. Y., the champion tree planter of the United States, has increased his tree-planting program by one million trees.

The Harriet Stevens Literary Club of Dayton has planted sixty trees, one for each member of the organization. The trees were registered on the American Tree Association's honor roll by Grace S. Jenkins and Mary E. Telford.

Memorial trees for Governor Harvey, war-time executive of Wisconsin, have been planted at Camp Randall by the Lucius Fairchild Post.

Boy Scouts of Farmer City, Ill., helped the G. A. R. plant a memorial tree in honor of Civil War veterans.

The Reading Coal & Iron Company has planted 284,000 trees near Pottsville, Pa., as part of its reforestation program.

Through Lena Peebles, the secretary, the Cleveland Cuyahoga Falls Association has joined the Tree-Planting Army. The association is made up of Falls people now living in Cleveland.

Work of beautifying the highways of Toledo by planting trees is under way. The Chamber of Commerce and the Toledo Auto Club are cooperating in the work.

Children of the Troy, N. Y., Day Home planted two memorial trees in honor of Mrs. Ellen Tappin Porter. The planting was done by Amelia Rush, Morris Butler, Victoria Salva and Francis Butler. Mrs. Lucy H. Sherman, of the board, was the speaker.

Joy Morton has presented to Nebraska Arbor Lodge the 70-acre estate where his father, J. Sterling Morton, founder of Arbor Day, lived.

The Concord Post of the American Legion planted a mile of memorial trees along the Daniel Webster Highway. Gov. Fred H. Brown, Mayor Willis H. Flint, Charles W. Howard, state adjutant general, and George W. Conway, commander of the post, helped to plant the trees. Charles Lathrop Pack sent a message of congratulation on tree-planting work to the Sixth National Convention of the American Legion at St. Paul last month.

The only way to join the American Tree Association is to plant a tree and register it with the Association, 1214 Sixteenth Street N.W., Washington, D. C. The Association will send tree-planting suggestions and a tree-day program for two cents to pay postage. Make your fall tree-planting plans now.

NOW READY!

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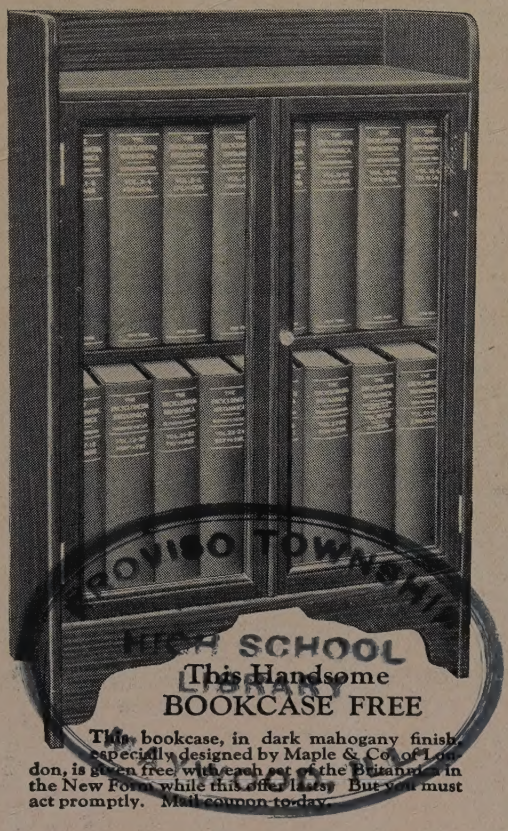

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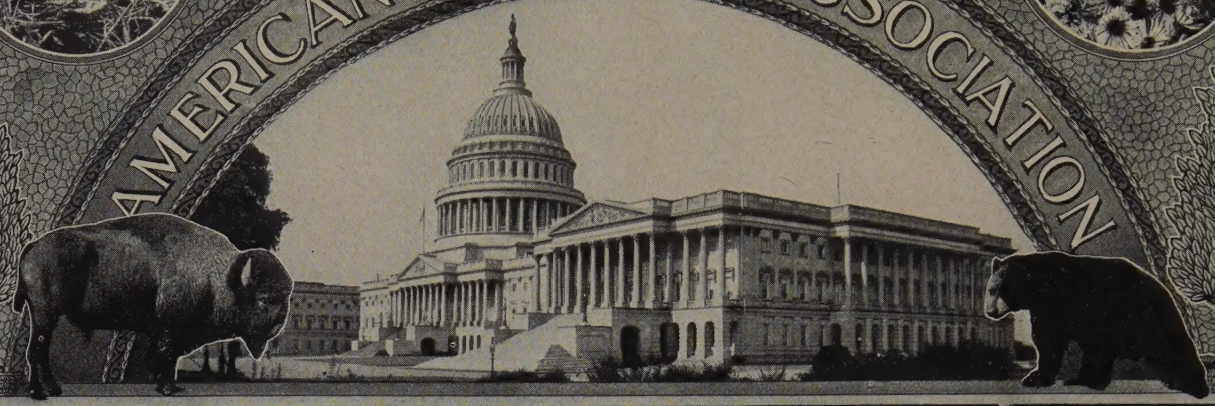

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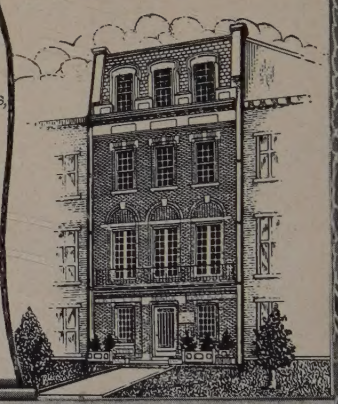

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October

Nature Calendar

OCTOBER

> "I love thee, Autumn, for thy scenery, ere
> The blasts of Winter chase thy varied dyes,
> That richly deck the slow decaying year.
> I love the splendour of thy sweet skies,
> The gorgeous hues that tinge each falling leaf."

Particularly beautiful is the rich blending of color in the Oak leaves. They are among the last to fall.

Sumac leaves blaze in the full glory of autumnal attire.

Ironwood, too, has changed to orange and scarlet.

Woodbine trails a vine of flaming leaves.

Blue and purple Asters and bright Goldenrod are still blooming in fields and meadows.

Bursting Milkweed pods send forth a cloud of balloon-like seeds.

Stick-tights are ever ready to take their first opportunities to extend their kind in distant fields. A walk across country will leave one's clothing well laden with these seeds.

You may hear a curious popping sound while tramping through the woods. Witch Hazel seeds are traveling.

The Jewel-weed or Touch-me-not distributes its seeds in a similar fashion.

Chestnut burs are scattering their nuts on the ground.

Here the Chipmunk comes for supplies to fill his store-house. By this time he is well stocked up for the winter.

Birds are feasting on the seeds of the Swamp Rose Mallow.

Kinglets are migrating.

Goldfinches are fond of Sunflower seeds. They make the old dried plants in the garden rattle with their vigorous picking.

Large orange Pumpkins are ready for gathering.

The fruit of the Pawpaw tree is now a rich yellow.

Now is the time when Spiders make their egg-sacs for the winter.

With the first heavy frost the leaves begin to fall in fluttering showers from the trees.

This deprives such insect-eating birds as Fly-catchers, Swallows, Warblers and Vireos of their source of food and shelter and they begin to migrate southward.

Fields abound with flocks of Sparrows. They do a great deal of good by destroying the seeds of noxious weeds. You may find among them, Song, Chipping, Vesper, Tree, and Fox Sparrows.

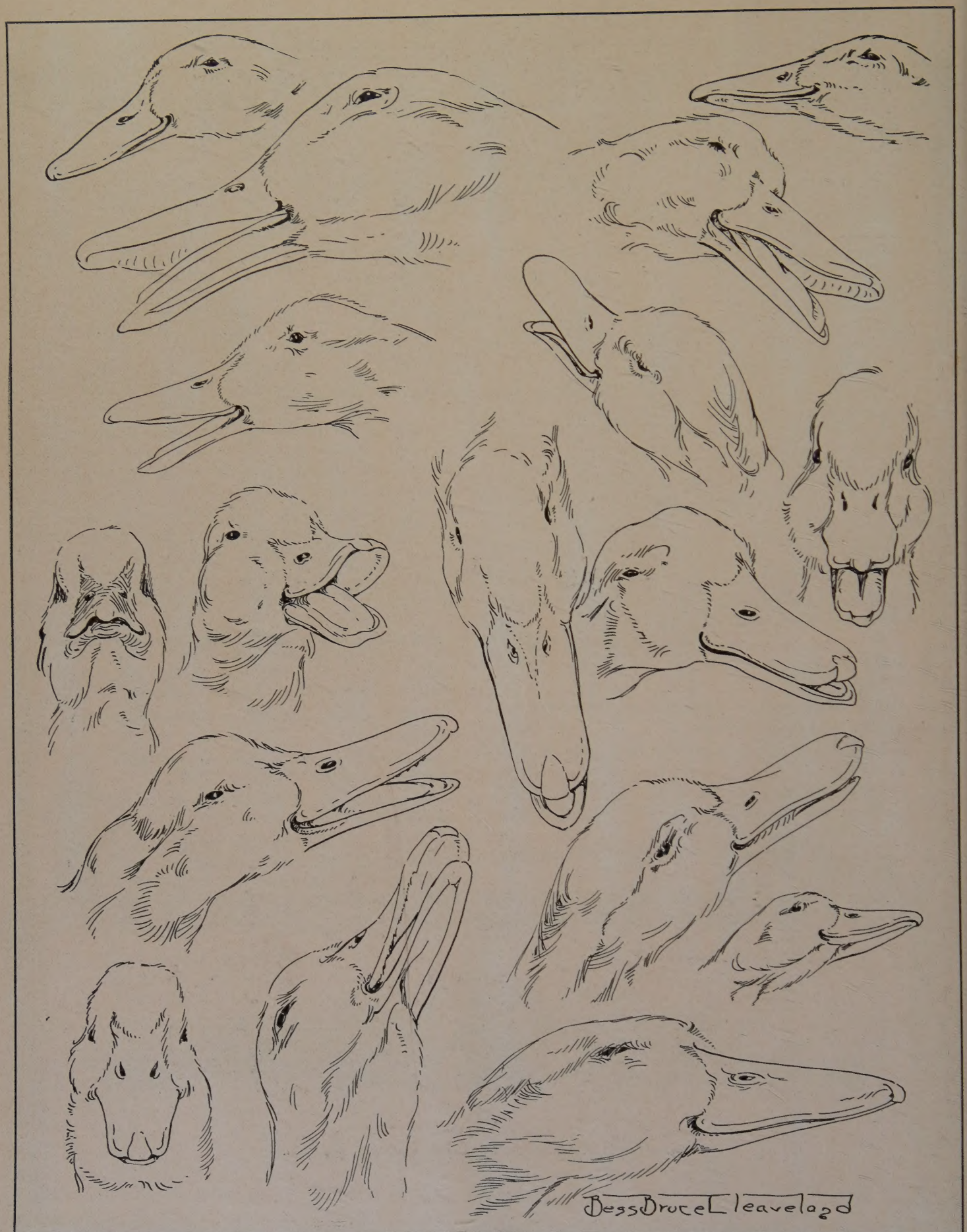
Grackles are out foraging for food in large companies.

Scattered flocks of Crows are frequently seen stringing across the sky.

Juncos have joined the permanent residents of our bird community.

By this time most of our fur-bearing animals, as well as the birds, are completely outfitted in their winter wardrobes and ready to combat the cold of the snowy period.

Prepared for NATURE MAGAZINE by the Cleveland Museum of Natural History



A STUDY IN EXPRESSIONS

NATURE MAGAZINE

Vol. IV OCTOBER, 1924 No. 4

The rounded world is fair to see
Nine times folded in mystery.
—EMERSON.

Hail and Its Half-Brothers

By CHARLES FITZHUGH TALMAN

Who does not talk about the weather? It is always on tap, but there are many who know little about it. That is why the series of articles written by this expert of the U. S. Weather Bureau are such good reading

BESIDES snowflakes, three different kinds of icy particles fall from the sky. All three have been called "hail," but nowadays scientific usage gives this name to only one of them, while the naming of the others has been a subject of much controversy.

True hail, as the term is now understood among meteorologists, consists of icy lumps ranging from the size of small peas up to and exceeding that of big oranges. The majority of hailstones are approximately spherical, but a great variety of other shapes occurs. One distinctive feature of a hailstone is that it is built up of alternate layers of clear and snowy ice, as may be readily seen in broken or much flattened specimens. A typical roundish hailstone has a snowy center, surrounded by from one to a dozen or more icy coats arranged like the skins of an onion. Sometimes numerous rays extend from the center to the circumference.

Hail occurs almost exclusively in connection with thunderstorms. It is usually of brief duration, though in rare cases it has been known to fall continuously in one place for more than an hour. It is always confined to a path much narrower than that of the thunderstorm as a whole. Though commonest in the warmer half of the year and in middle latitudes, it may occur at any season and practically all over the world. It is fairly common in the tropics and is occasionally observed far within the polar circles.

PHOTOGRAPH U. S. WEATHER BUREAU

WATERMELON BRUISED BY LARGE HAILSTONES

Such, briefly, are the characteristics of "true" hail. The two other things that are often called hail are so different that they undoubtedly deserve names of their own.

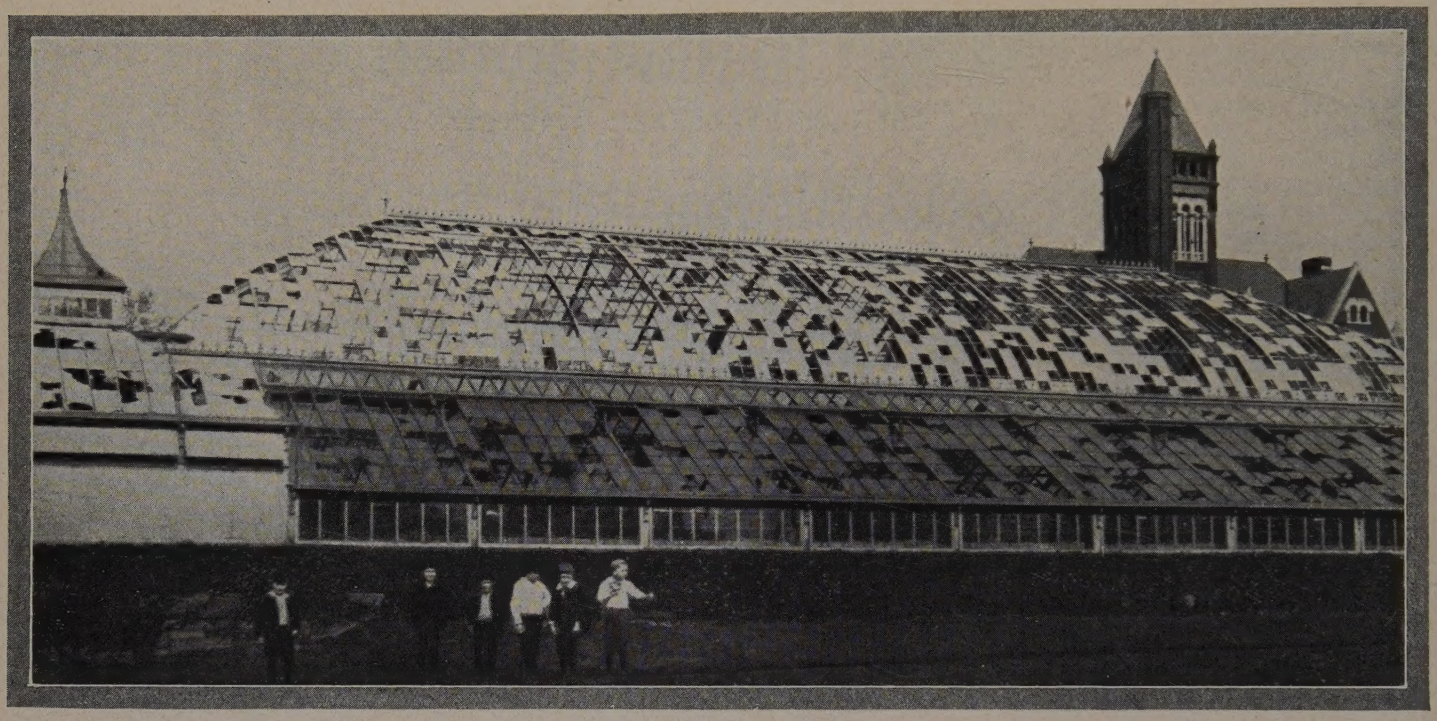
One of these takes the form of little pellets of compact snow — miniature snowballs

—about the size of coarse shot. This is, in fact, granular snow, and it occurs only in cold weather, often in combination with ordinary snowflakes. It was formerly known, in technical English, as "winter hail" or "soft hail." As it differs in both structure and origin from true hail, and as, though it crumbles readily, it is not really soft, both these names have now been abandoned by many authorities in favor of the German term "graupel" (in which *au* has the sound of *ow* in growl").

The other half-brother of hail also occurs in cold weather and consists of round or angular particles of clear ice. These particles are frozen drops of water—either raindrops or melted snowflakes. Popularly, this form of precipitation is called either "hail" or sleet." The Weather Bureau has generally called it "sleet," and a few years ago a board appointed by the bureau, besides confirming this practice, decided that certain other things that have heretofore been called "sleet" must hereafter bear other names.

This decision unfortunately has not done away with the fact that the word "sleet" has three distinct meanings in the English-speaking world. In England it is nearly always applied to a mixture of snow and rain, and the same usage prevails to some extent in this country. Again, a great many Americans, including most engineers, have long applied the name "sleet" to the smooth coating of ice, due to rain falling in cold weather, that at times envelops the branches of trees, wires and other objects and gives us the beautiful spectacle of the "ice storm." British meteorologists call this "glazed frost"; our Weather Bureau has lately coined for it the name "glaze"; and on both sides of the Atlantic it has sometimes been known as "silver thaw." Lastly, the "sleet" of Weather Bureau usage is widely so called in America, and sometimes so called in Great Britain. A few British meteorologists have tentatively styled it "ice-rain," but this name has never become established.

In view of these facts it is a safe forecast that the term "sleet" is destined to cause meteorologists more worry in years to come than the term "cyclone"—which most people still misapply to the tornado—has caused for many years past.



PHOTOGRAPH U. S. WEATHER BUREAU

AFTER THE HAILSTORM

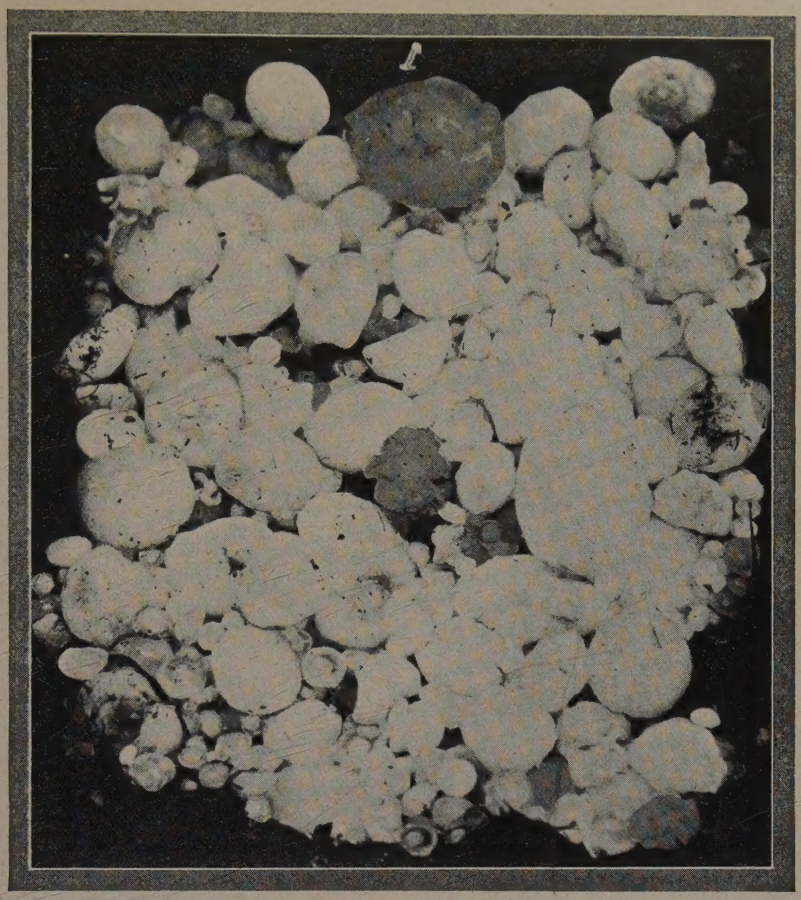
What hail did to a conservatory roof at Allegheny, Pa.

Graupel and sleet are not of much practical importance, as their particles are too small to break glass and they do not generally fall during the season of agriculture. Hail, on the other hand, is one of the most destructive of atmospheric agencies, doing damage estimated to average more than $200,000,000 a year throughout the world. Most of this loss is borne by growing crops.

A clue to the origin of hail is furnished by the appearance of the typical hailstone. The successive layers of clear and snowy ice are evidently acquired in the course of several journeys up and down, between relatively cold and relatively warm levels of the atmosphere, before the stone finally falls to

earth. At high levels the incipient hailstone is coated with snow, and at lower levels with rain, which turns to ice as the stone is again carried aloft. Probably the only place where such a process could occur is in the turbulent uprush of air at the front of a thunderstorm, consisting, as it does, of blasts violent enough to drive the heavy hailstone upward, alternating with lulls that would permit it to fall.

The question always asked after a severe hailstorm is: "How big were the hailstones?" In answering this question it is important to distinguish between the size of the stones as they fell and that of the lumps of ice subsequently found on the ground. Many small hailstones lying closely packed together may readily coalesce into a single mass, and this doubtless explains some of the remarkable stories that have been told of enormous hailstones. The greatest possible size of a falling hailstone cannot be definitely stated, but there are many trustworthy records of stones weighing more than a pound. Hailstones weighing a pound and a half fell in Natal on April 17, 1874, passing through a corrugated iron roof as if it had been made of paper. At Cazorla, Spain, on June 15, 1829, houses are said to have been crushed under blocks of ice, some of which weighed four and a half pounds. In October, 1844, a hailstorm at Cette, France, wrecked houses and sank vessels.



PHOTOGRAPH U. S. WEATHER BUREAU

GLEANINGS FROM A KANSAS HAILSTORM

The largest hailstone at the top of the pile and numbered 1 measured thirteen and one-half inches in circumference.

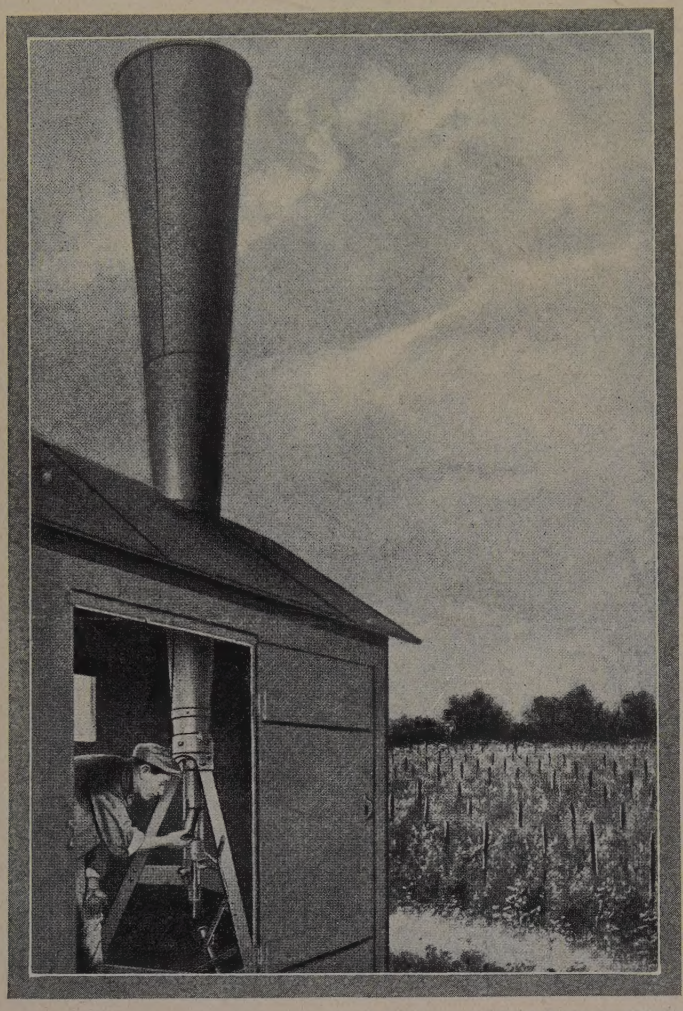
Cases in which human beings have been killed or badly injured by hail are very rarely reported, and, strange to say, the great majority of these reports have come from India. The most remarkable case on record occurred in the Moradabad district on May 1, 1888, when about 250 persons perished in a hailstorm. While some of the victims were killed outright by falling hailstones, many probably died of exposure owing to the severe cold attending the storm. There are several other authentic reports of fatalities during hailstorms in India, but only one such case appears to have been recorded in Europe, and the writer has never heard of a case in this country. On June 22, 1915, hailstones as big as baseballs and oranges

PHOTOGRAPH FROM PROF. MARCEL MOYE

A HAILSTORM THAT BLOCKED TRAFFIC

Street scene at Montpellier, France, after the remarkable hailstorm of May 13, 1922. The hail lay to such a depth that the inhabitants were obliged to shovel it from the pavements, the same as after a heavy snowstorm.

fell over a considerable area in Maryland. At Annapolis heavy wire-glass was shattered in skylights of the Naval Academy buildings. The fall of hail lasted for fifteen or twenty minutes at Annapolis,



COURTESY SCIENTIFIC AMERICAN

A DELUSIVE REMEDY FOR HAILSTORMS

Millions of dollars have been wasted in Europe in the fruitless process of bombarding the clouds to prevent the fall of hail. Funnel-shaped mortars are used, as here shown. They discharge no projectile, but emit a whirling ring of smoke.

which has a population of ten thousand, yet there was no loss of life, and only two cases were reported in which persons received scalp wounds of sufficient severity to require hospital treatment.

The most famous of destructive hailstorms is one which occurred on July 13, 1788, in Europe. Beginning in the center of France in the early morning, it passed northward in two parallel bands, about 12 miles apart, crossed Belgium, and finally died out in Holland in the afternoon. The western band was about 10 miles wide and 420 miles long; the eastern, 5 miles wide and nearly 500 miles long. Profound darkness preceded the passage of the storm. No less than 1,039 communes in France suffered from this visitation, and the total loss was nearly $5,000,000. It is said that the distress occasioned by this storm hastened the outbreak of the French Revolution.

Among the cultivated plants most susceptible to damage by hail are grapes, olives, tobacco and hops. Probably nowhere else in the world are the losses due to this cause so great as in the vine-growing districts of southern Europe, and here two curious practices have long prevailed, based on the delusive belief that the efforts of man can prevent hailstorms.

FROM E. SCHARF, "DER HAGEL"

RAPESEED INJURED BY HAIL

The white specks were made by hailstones. In Europe elaborate studies have been made of the effects of hail on the various agricultural plants, as an aid to adjusting claims in connection with hail insurance. Expert knowledge is often required to distinguish hail damage from injury due to insects, diseases, wind, rain, etc.

"Hail-shooting" and the use of "hail-rods" are the European equivalents of the "rain-making" enterprises upon which American farmers occasionally waste their money, but have been, in the aggregate, far more expensive to the people concerned.

Gunfire plays a versatile rôle in the field of weather superstitions. It is credited with equal power to dissipate waterspouts, to produce rain, and to drive away hail. In all three cases the use of explosives merely continues with modern improvements the ancient custom of attempting to frighten

the clouds by the discharge of arrows, the clashing of swords and the like. Firing cannon at the clouds to avert hail began centuries ago in Styria and northern Italy, and was well established in France before the Revolution. The custom experienced a great revival about the year 1896, when a special type of cannon was introduced for the purpose in Austria. This was a small mortar, to the muzzle of which was attached a sheet-iron funnel. No projectile was used, but the discharge sent aloft a curious whirling ring of smoke and gas, and the explosion was powerful enough to splinter sticks and kill small birds several hundred feet from the cannon. The success claimed for these cannon led to their employment on a vast scale over a great part of southern and central Europe. By the year 1900 at least 10,000 of them were in use in Italy alone. Several modifications of the original device have since been introduced, and manufacturers have placed on the market various types of hail-shooting bombs and rockets, claimed to be more effective than the cannon because they explode directly in the clouds. Since, however, the formation of hail probably occurs miles above the ground, and in a body of air that is in violent commotion, owing to the natural process of the thunderstorm, the effects of all such explosions must be utterly negligible.

PHOTOGRAPH BY U. S. GEOLOGICAL SURVEY

EFFECTS OF HAIL ON SOFT MUD

The hail-rod, known in French as a *paragrêle,* is merely a special form of lightning-rod, and was introduced at a period when the production of hail was believed to be due to the electrical rather than the mechanical action of the storm. Even so great an authority as Arago thought that rods attached to balloons might draw off enough electricity from the clouds to prevent hail from forming. The original *paragrêle* was a wooden pole with a metal tip, which was connected with the ground by a cord or wire. It is said that a million or more of these rods were erected in various parts of Europe during the first quarter of the nineteenth century.

The use of hail-rods was afterward completely abandoned for many years, but in 1899 a much more pretentious device of the same character was introduced in France and soon attained great popularity in that country. This was a large copper rod, grounded by means of a copper conductor, and installed at as high a level as possible; in some cases on church steeples or other tall edifices, and in other cases on great steel towers erected for the purpose. This device was fantastically named the "electric Niagara," because, according to its promoters, it drew down veritable "torrents" of electricity from the clouds. Hundreds of these "Niagaras" were erected, in some cases being set up in rows, or so-called *barrages,* across the habitual paths of hailstorms. Vehement discussions in regard to their merits prevailed in France down to the outbreak of the World War, but at present

HAVE you ever seen a tree 276 feet to the first limb? Have you ever seen an acre of trees which would furnish enough lumber to build a good-sized town? Readers of NATURE MAGAZINE *will hear of these and other things in the field of forestry as a result of a recently completed trip made by Richard W. Westwood, Assistant Editor of our magazine. Among the articles will be one on the Redwoods of California, another on the glorious Douglas Firs and a third on the problems of Indiana, a state whose forests have gone.*

PHOTOGRAPH U. S. DEPT. OF AGRICULTURE

A COTTON FIELD AFTER A HAILSTORM

Showing the plants stripped of all leaves and of much cotton. The damage wrought by hail throughout the world is estimated to average $200,000,000 a year. Most of this damage is done to growing plants.

little is heard about them, which is just as well.

In contrast to these futile undertakings, the practice of insuring crops against hail has proved a boon to the cultivators of the Old World for more than a century, and has recently become popular in America. In some European countries and in certain parts of the United States and Canada the business of hail insurance is conducted by the Government. According to a report on this subject published by the United States Department of Agriculture in 1920, the amount of such insurance carried in this country was more than $559,000,000.

The Expedition of the American Nature Association along the western coast, stretching north from Vancouver to the Alaskan line, has just returned.

This is a land of endless wonder and beauty, a country of great ranges, swirling tides and primeval forests; of bays and arms of the sea curving for miles in among the mountains. Its waters are rich in varied life of the sea; its forests abound with native animals of the wild, its rocks and promontories are the homes of birds of the waters. It is the inner passage of British Columbia.

Armed with cameras and motion picture reels, William L. and Irene Finley, Arthur Newton Pack, associate editor of NATURE MAGAZINE, *and others penetrated the almost untouched glory of this country, and soon the readers of the magazine will reap the benefit.*

You will find the stories of the nature expedition aboard the good ship Tusitala ("Story teller," if you will recall your Stevenson), of entrancing charm. There is a wealth of photographic material from this trip, and you may look forward to some rare enjoyment in the succeeding issues of NATURE MAGAZINE.

Lions of the Sea

By WILLIAM L. AND IRENE FINLEY
Of the National Association of Audubon Societies

(PHOTOGRAPHS BY H. T. BOHLMAN AND THE AUTHORS)

OFF SHORE the water whitened at the base of three big basaltic rocks, guano-gray with the uncounted colonies of sea fowl. Just above the wash of the waves lay the flippered forms of a herd of sea lions, stretched in the sun like logs rolled up by the tide. Suddenly a gasoline boat rounded in from the sea. Two men with repeating rifles opened fire into the sleeping herd. The lumpish forms rolled and humped as they wallowed wildly down the ledge and flopped into the sea. A bull and two cows failed to reach the water. The helpless calves bunched and wiggled further up the rock. As the heads of the frightened mothers bobbed to the surface, the hunters continued their deadly fire until the water washed red across the barnacled reefs. Then they cleared for other waters before the arrival of the watchful federal warden.

STORIES of birds and animals by William L. and Irene Finley have been a frequent treat for the readers of NATURE MAGAZINE. *In the accompanying article the Finleys take us on an absorbingly interesting trip in a new field. We go with these noted naturalists to the craggy islands where the sea lion makes its home and rears its young. We enjoyed reading this adventure among the mammals of the sea and know that you will.*

Three Arch Rocks, where the slaughter took place, lie a mile off the Oregon coast, six miles south of Tillamook Bay. It is a federal reservation for the protection of wild birds and animals, established by executive proclamation of President Theodore Roosevelt, October 14, 1907. It has been raided several times by those who are bent on the extermination of sea lions. To the salmon-canner, the gill-netter, the seiner, the trap man and the fish-wheel owner, these mammals of the sea prey on their salmon. The Fish Commission of the State of Oregon hires a professional hunter to kill sea lions because the schools of salmon are diminishing. Are these lions of the sea the cause of smaller salmon runs, or are the commercial interests harvesting at the expense of the future?

Along the shoreline opposite the rocks, the bodies of five old lions were rolling in with the drive of the waves. A young sea lion struggled in the breakers. The roly-poly baby could not get back into deeper water. He dove and dove, but came up exhausted. Soon he washed ashore at our feet near the body of a dead mother. Instead of going down the beach to get clams, we filled the sack with the little sea lion and lugged him back to camp.

There we got a bottle and a rubber nipple and tried to give the famished young sea lion a drink of warm milk. He was worse than any calf I ever tried to feed. By sheer force, we got the nipple in his mouth, but he wouldn't hold it there a moment. He immediately began humping up and butting

SEA LION MOTHER AND YOUNG

As far as known, the sea lion has but a single young one. This baby is being visited by two of its playmates.

around with his head as if he was in the habit of taking his dinner on the jump. When he got a taste of milk, he was wilder than ever in his movements. The milk didn't go through the nipple to suit him at all; we simply had to up-end the bottle and give him a big gulp at a time. This led us to think that the mother must have some way of injecting him with a rapid flow of milk, for there was no indication that he knew how to sit quietly and suck. What we really needed was a squirt-gun or a force-pump to give him a satisfying stream.

OLD BULL SEA LION

These big fellows weigh as much as half a ton. In the foreground is a small calf.

Our sea lion baby, nevertheless, thrived on the milk we gave him for a few days until the weather moderated so we could launch a boat in the surf. Then we took him out to his home rocks a mile off shore and placed him on a lower ledge of rock with another young sea lion of his own size and age.

Here, on the ledges of the sea cliffs, there was no sign of civilization. The great hulks of the sea lions lying asleep in the sun or sporting in the water, the roll-shaped puffins with beaks like prows of battleships, the gaunt black cormorants with snaky necks and green eyes, that sat at rigid attention beside their nests, the murres that hobbled and sprawled along to the edge of the cliff and dropped off, landing with a splash and literally flying under the surface, using the wings like the flippers of a sea lion—all these things were foreign to our daily lives. As I crawled along the ledges, crept into the wave-washed caverns, listened to the suck and swash of the water that drove up from below through the deep barnacled crevices with the flux of the sea, I could feel the cave-dwelling instinct that lived again within me. We had brought a cask of water and provisions. If we were storm-bound on the rocks, as was not unlikely at this season of the year, we could live on the big pear-shaped eggs of the murre that lay thick in the crowded tenements under the roof of the rock.

In the several days we spent about Three Arch Rocks, we had a chance to see a little of the home life of these big lions of the sea. The largest colony is on one of the low-lying inner rocks where the basalt slopes up to a height of thirty feet. The highest part of this rock was held by a large old bull that looked as if he weighed nearly a ton. He was a battle-scarred monarch. During the spring season the bulls fight viciously for supremacy. Around on the lower ledges were several other bulls. One in particular had been worsted, for there was a bloody gash in his left shoulder, or it

TWO MOTHERS AND HERD OF CALVES

These stayed on the rocks when the camera man approached; the others flocked into the sea.

SEA LION CALF

Note the flippers-like front feet and his hind fin-feet and their position.

THREE ARCH ROCKS

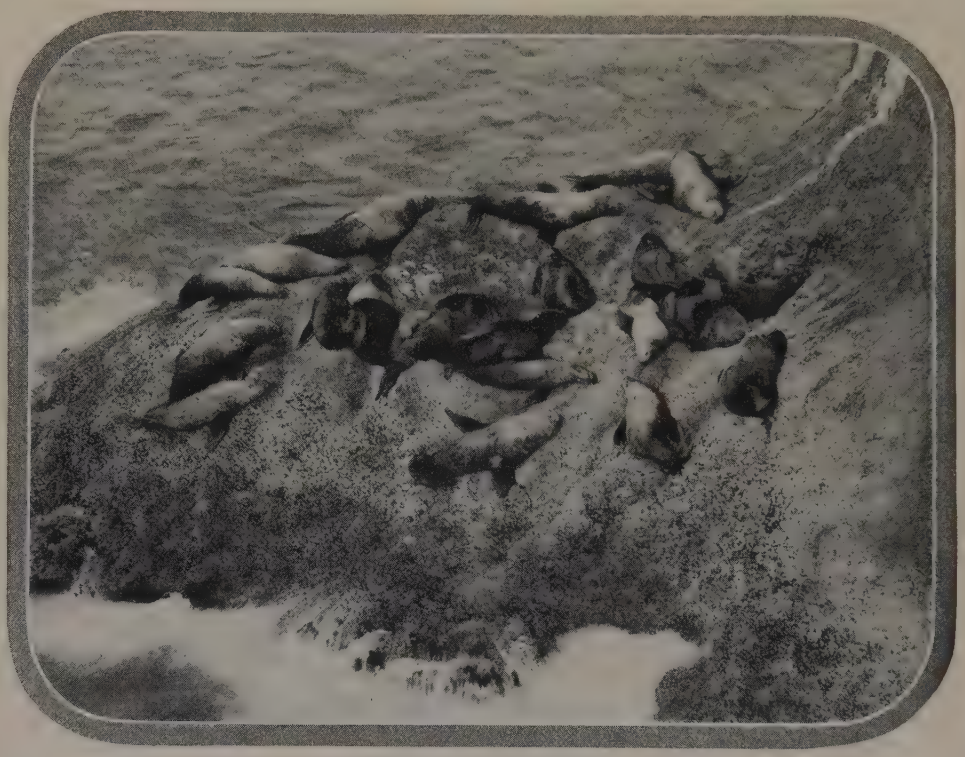
Reservation off the Oregon coast where sea lions live on the lower ledges.

might have been the glancing rip of a bullet.

The sea lion is an awkward looking mammal with triangular front flippers in place of legs and feet, and at the rear two short hind fin-feet extending at right angles from the body. On land these flippers are about as useful in making headway as a man's feet would be if tied together. The best he can do with his front flippers is to balance himself and hold on to the rock. In moving along a ledge, an old lion has a sort of a hobby-horse gait. He rocks forward with his body, hitches up his tail end and bows his back like a measuring worm. In going up a rock, he makes very slow time, but if he is scared he can hump down toward the water with considerable rapidity. Apparently he could gain more headway if he just folded his flippers and rolled.

While a sea lion is awkward on land, he is expert in the water. Once when I was on a rock above and could see clearly into the water below, I watched two lions playing. They propelled themselves along by the tail flippers, rolling under and over each other, weaving smoothly in and out in a very graceful way, using the side flippers only on the turn. A large part of the summer day is spent in a sun-bath, lying on the rocks above the beat of the waves. When asleep, these aquatic animals crowd close together, making a lifeless looking heap until one rolls his head aloft to bellow about being crowded too much and turns to lie in a different position.

A fancied resemblance between the folds of skin on his shoulders and the heavy mane of an African lion seems to have given this mammal his name. Like the lion of the woods, this big mammal of the sea is carnivorous or flesh-eating, living to a large extent on squids and other salt-water creatures. As a rule, sea lions stay out in the ocean and along shore, but sometimes one enters a harbor like the harbor seal. While seals have a habit of eating salmon, occasionally stealing them from the gill-nets of the fishermen, a careful survey by experts shows that sea lions do comparatively little damage in this way.



A HERD OF SEA LIONS

They are taking a sun-bath on the rocks, and at a distance look like driftwood cast up by the tide.

One day I came around the point of a rather narrow rocky ledge and found myself face to face with an old sea lion bull. I felt I was between the devil and the deep sea, for I knew I couldn't retrace my steps in a hurry. As I stood gazing into his tiny expressionless eyes, I couldn't tell just what his intentions were. He might be merely curious; then again, he might be looking for another fight, as I couldn't help noticing he was scarred and cut. My camera was ready, but I feared that even the click of the shutter might start trouble. Nevertheless I raised the camera, not taking my eyes from the beast, and began talking quietly to him as if he were a person. One plate was exposed and then with a slow and deliberate movement, I backed out of sight along the ledge and quickly climbed to safety above. While the old sea lion had not moved a muscle, later I had very clear proof of my own nervousness, for the photograph was badly blurred. Only later did I discover that he was as harmless as a baby.

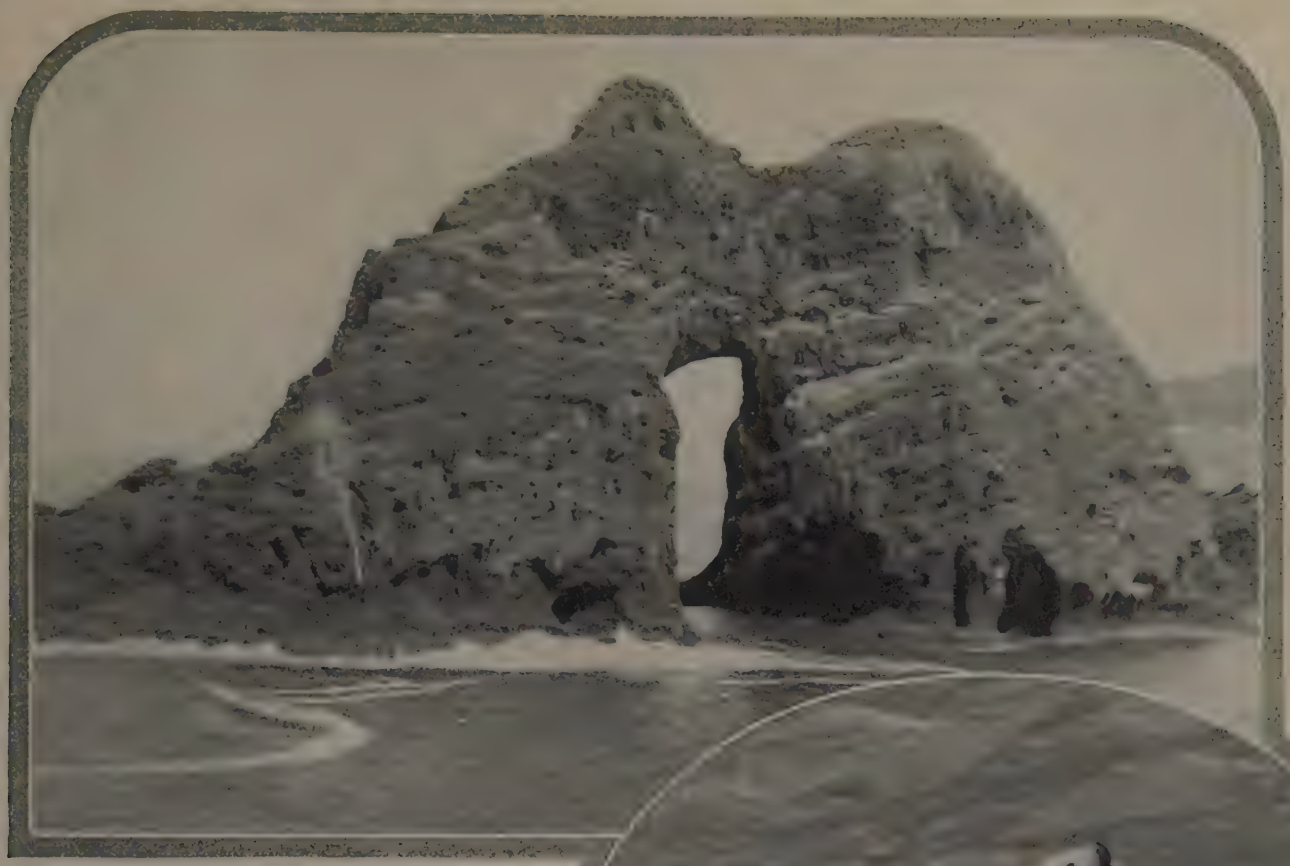
In my experiences in moving among sea lions on the rocks, I found them timid and easily scared. I have never seen one that really showed antagonism toward a person and, as a rule, when approached, these animals began taking to the water.

An old sea lion bull will gather around himself a number of wives. His aim at the beginning of the season is to select a ledge or home spot and fight to keep the other males away. In the early part of the season, the bulls fight viciously for the possession of the most favorable spots where the females are accustomed to rest and have their young. You can see that during the summer season an old bull sea lion with eight or ten wives has his flippers full to defend his fort. It is said he keeps to the task night and day, not taking time off even to eat.

Once I saw a lone old bull about thirty yards up the slope of the rock. He had a high isolated spot of his own and did not see me until I approached within about twenty feet. Then he was scared. He got under way slowly by racking and hobbling along like a boy in a sack race, and it seemed as if he were about to up-end at every jump. At last he hit the water with a splash that sent the spray flying.

It was difficult to make an accurate study of the habits of these sea mammals, because they were naturally disturbed to some extent by the presence of a person. The female seems to have only one young to which she gives birth on the rocks above the wash of the waves.

Upon the approach of a human, the old ones hobble into the water, leaving the young to crowd together and climb back along the ledges. However, one day when I approached, I saw a mother stay with her calf. She climbed further up the rock away from the water, and all the other young along the ledge crowded over and around her for protection. The family occupies its own particular spot for a month or so until the little ones are able to move around and finally follow their mothers into



Rocky home of birds and sea mammals on the Pacific coast.

OLD SEA LION SWIMMING
Note smallness of head in comparison with his body.

the water. When they are small the calves seem to get lost easily if they get into the water away from the ledges where they are born.

The bellowing of an old sea lion, echoing through the caverns of the great rock arches, sounds like the roar of distant thunder. The noise of the deep-throated bulls is broken by the barking of the females and the younger animals. As they all lumber into the foam, one is reminded of the beasts in the fables and the uncouth forms of weird creatures that lived in the primordial periods of the past.

Where we camped on the rocks, we invaded the den of a huge old bull that was perhaps driven out from the rookeries by the younger and the stronger. He had selected this little cove away from the rest to pass the last days of life in lonesome bachelorhood.

On the Pacific coast, there are two species of sea lions, the California sea lion ranging along the coast of that state, and the Steller sea lion ranging from the California coast north into Alaska. The latter animal is considerably larger. The largest of the old bulls will measure about ten feet and the estimated weight is about twelve or fifteen hundred pounds. The females or cows are more slender in build and quite a little smaller in size, weighing perhaps four to six hundred pounds.

Just south of the entrance of San Francisco Bay is a well-known rock frequented by California sea lions. For many years this has been an attractive feature because it is one of the few places where people can see these strange mammals of the sea.

Years ago commercial fishermen around San

(CONTINUED ON PAGE 256)

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FORTY-FIVE FOOT FINBACK WHALE

The photograph gives a good impression of the size of this marine monster, which is valuable for whalebone, for oil and for food.

A Stranded Whale

By P. A. EDWARDS

THIS 45-foot whale, which was washed ashore on the Isle of Wight, is one of the Finback whales, of which there are several species, all belonging to the group producing whalebone, which, with the oil, furnishes the incentive for their pursuit. The carcass has been partially flensed, exposing some of the vertebral processes.

Whaling was carried on by the Norwegians as early as 900 A. D. At first the animals were pursued by boats sent off from shore, but as they became scarcer, this method was largely abandoned, and well-equipped vessels were sent on long voyages after them. Whaling was at its height about 1846, when about 730 vessels are believed to have been engaged in the industry.

As an illustration of the rapid diminution of these sea monsters it may be stated that Captain Scammon, a noted authority on whaling, estimated that about 1853 as many as 30,000 gray whales were present on the California coast; during the period from 1919 to 1922 only a single individual was captured there.

Whaling has gradually come to be more and more unprofitable due to several causes. Whalebone and whale-oil have largely been supplanted by other materials, but the most important of all causes has been the continued decrease due to improved methods of destruction. Steps are now being taken to restrict indiscriminate killing, especially by methods involving waste, such as depth bombs.

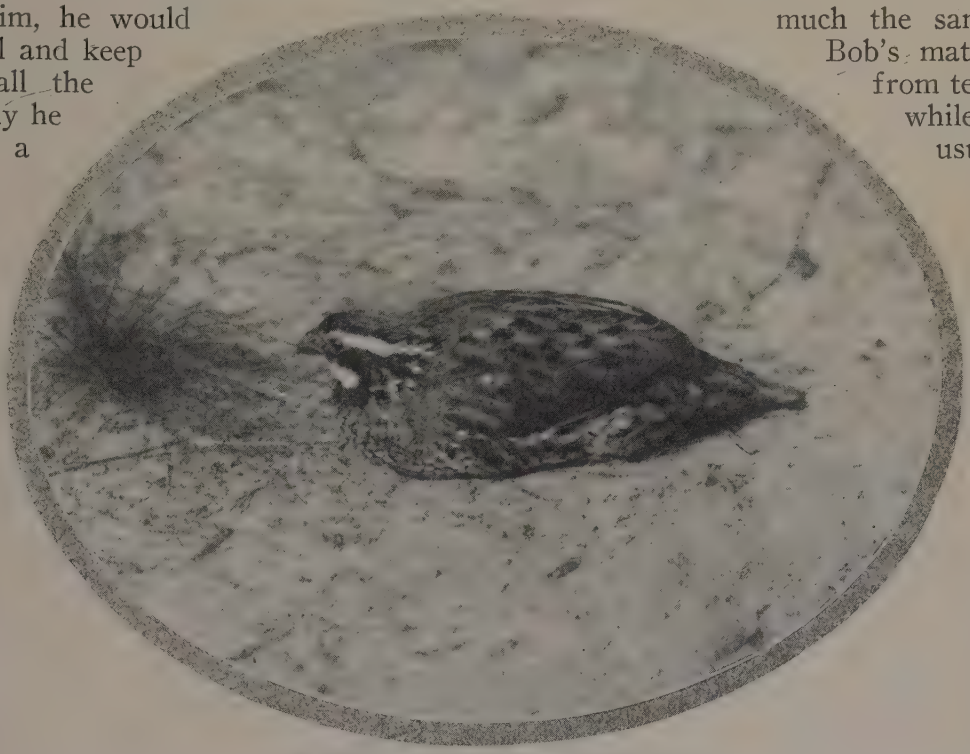
Whaling in Arctic waters, which was formerly one of the most important fields, is now almost a

(CONTINUED ON PAGE 212)

Bob White! Bob White!! Bob White!!!

By JOSEPH W. LIPPINCOTT

WHEREVER Bob White was once plentiful he still has persistent friends, nor can the big English ring-neck pheasant which is now being released on some of his old ranges ever quite take his place. There was something very lovable about Bob. Each year as soon as warm spring days brought out enough green leaves in the thickets to safely hide him, he would start his love call and keep it up through all the summer. Generally he would mount a fence-post or a stone wall or perhaps a bench in the garden where his "Bob, *Bob*, WHITE!" could be heard far and wide. To be sure, it was just a whistle, yet so spirited and musical that, morning or evening, it was always pleasing.



BOB WHITE LYING LOW

The white streaks on head and neck are replaced by brown in the case of the female.

When Bob thought his demure little lady love was nearby, he added to the whistle a series of other notes, softer and more tuneful; and when he found her, after she had hidden from him part of the day, he would greet her with the gentlest twittering that ever came from the throat of a bird.

In other parts of the pasture or edge of the woodland, Bob's former male friends could be heard whistling also, particularly early in the morning and in the evening. Although they had been his covey mates all winter, he regarded them as rivals now and would not tolerate their coming near his chosen range. While Bob carried no spurs, he was a fighter just the same. After furiously buffeting a rival male with his strong feet in the manner of a game cock and knocking the fight all out of him, he would chase the other until entirely out of breath. Around and around the grass clumps they would dart, their legs moving faster than the human eye could follow; then the rival would finally lose heart and fly away to his own part of the covey's range, leaving Bob to resume his tender love making.

The nest was invariably placed under a bunch of grass or under weeds or brush in such a way that the showy white eggs could not be seen by an enemy. A meadowlark arranges hers in much the same manner; but Bob's mate laid anywhere from ten to twenty eggs while the meadowlark usually was satisfied with from four to six.

Bob, very attentive these days, took part in brooding on the eggs and later in caring for the young, which had to be led about and warned of danger as well as kept warm and sheltered from hard rains. The little ones were at first scarcely larger than bumblebees and resembled newly hatched game bantams, their plaintive peeping being much the same also. They had the hiding instinct and from the first could flatten themselves on the ground to resemble dead leaves or dart into the grass just as quick as a flash. Their parents gave them warning by a peculiar throaty note scarcely audible to any ears but theirs.

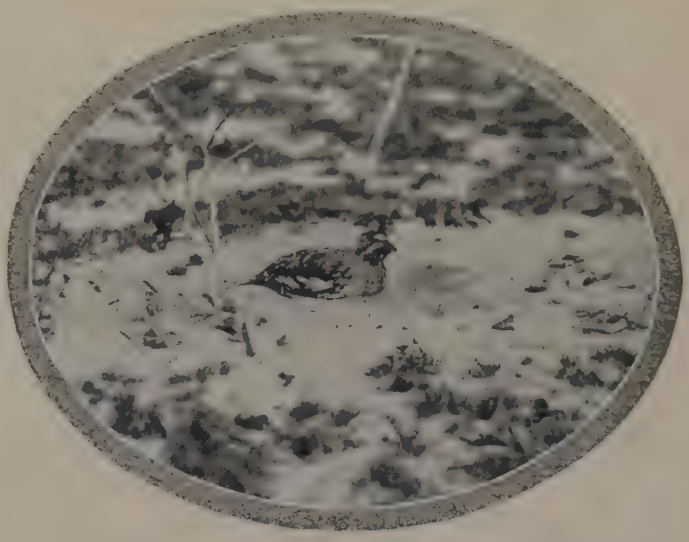
The little covey when happily feeding and moving about was constantly "talking," the notes being so soft that they could scarcely carry above the meadow grass. This same gentle talking continued when the little ones grew up. It was a means of keeping the birds together in their wanderings.

As the little ones grew older they came in touch with other broods and, towards the end of the summer, joined forces with all those in the vicinity. There was, however, a limit to the size of a workable covey, and when the birds were very numerous

they split into or naturally remained in bands of about twenty-five.

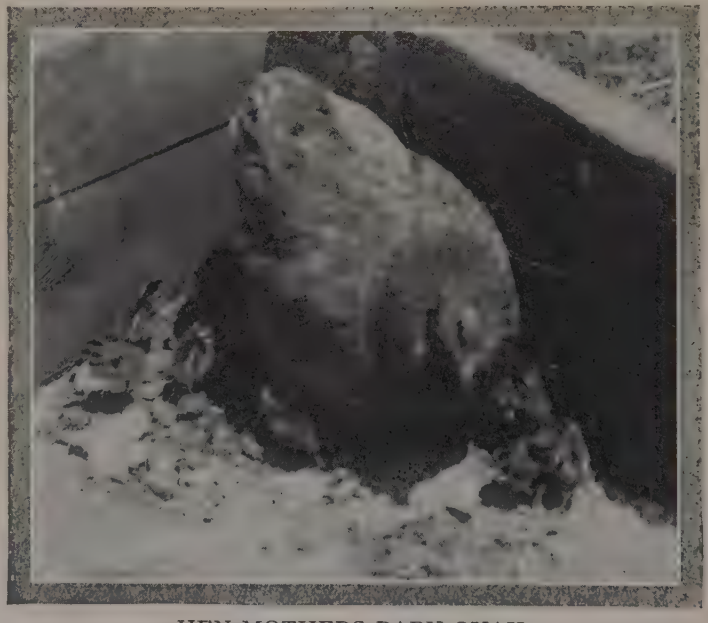
When I say that the average full-size covey numbered about twenty-five birds, I think I should state that once in Florida I saw a covey of Bob Whites which contained, I am certain, well over two hundred. The birds had come out of an immense drained swamp to feed in a near-by corn field. I believe that there were eight or ten different coveys gathered there, but they rose as one and flew back to the swamp in a perfect cloud and with a roar resembling a flock of mallards leaving the water.

Another very large covey I saw was roosting, but not in the usual ring with all tails together and heads pointing outwards. This time there were so many birds that, while those on the outer edge faced away from the center, the ground inside the big ring was covered with birds facing in all directions. Those on the edge were so close together that they touched but each one in the center had more room. The arrangement permitted sudden unanimous flight without much if any interference with each other. It was remarkable to see how they had instinctively worked out a problem that was surely difficult. Many times in tramping across fields after dark, I have scared up large coveys without finding any serious confusion in their hasty flight. The same care applies to their choice of a roosting site. If much molested by the foxes and other keen-scented night prowlers, they often come close to farmhouses or hunt out briar clumps too dense and prickly for their enemies to enter. I know also of several coveys in New Jersey which year after year roost on small islands in a swift river, and in Florida I have seen coveys fly, just before nightfall, across some fifty yards of lake to a grass-covered island. On the other hand, if unmolested, they roost close to their feeding grounds and, except in very stormy weather, with nothing above them except the sky. Attack from above they do not seem to fear, no doubt having found out that owls cannot distinguish them when they keep still.



HEN QUAIL HAVING A DUST BATH

It is the cock bird which uses the call "Bob White" and not the hen.



HEN MOTHERS BABY QUAIL

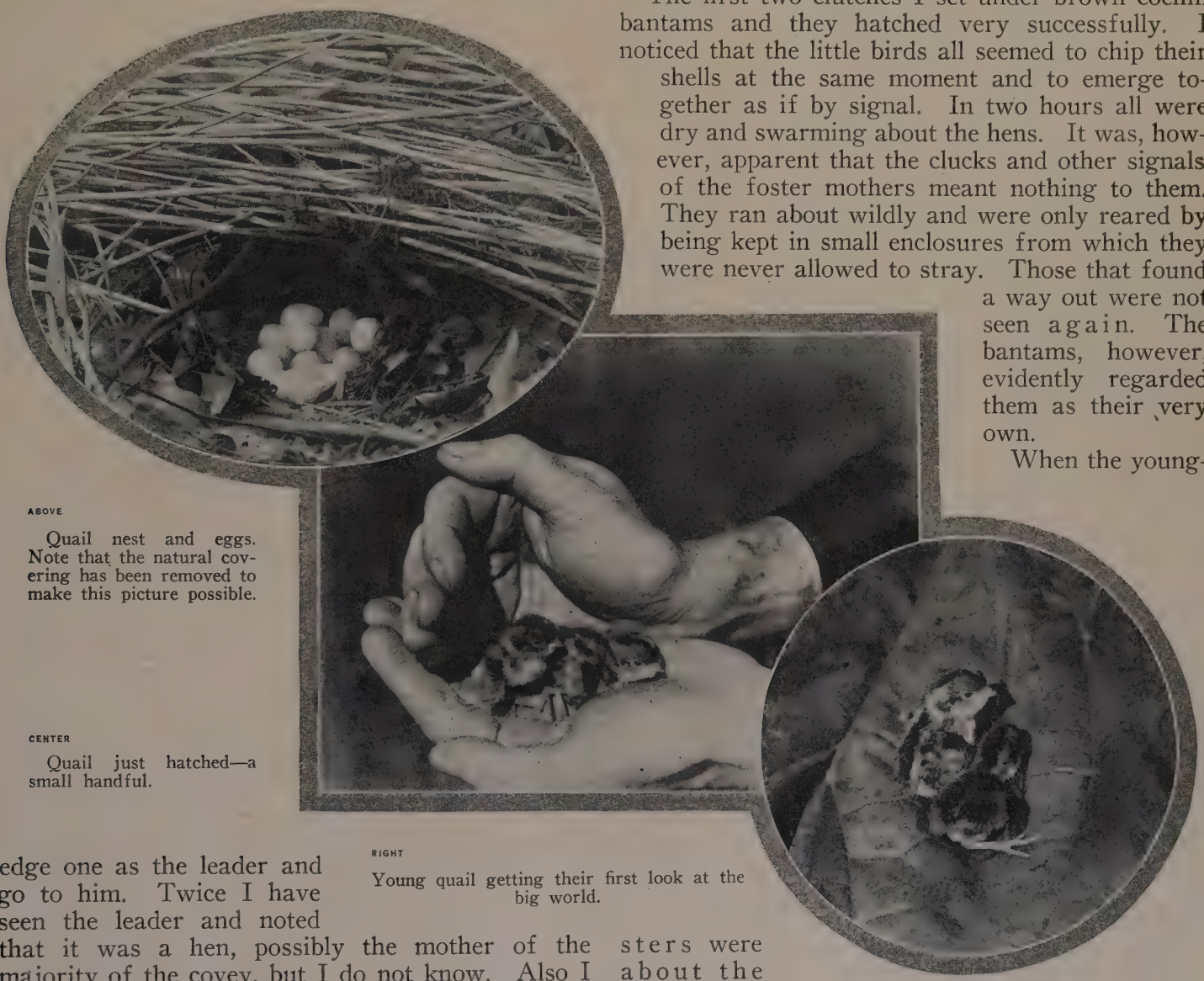
These youngsters are only one week old and get along nicely with their foster mother.

Bob White always has some thicket or other good hiding-place to which he can run or fly. Some birds learn how to hide in the dense foliage of trees, and sometimes whole coveys seek refuge in such places when disturbed. Occasionally birds, especially if wounded or tired from long flights, will run into hollow logs or down any deep burrow available. I have seen a whole covey fly nearly straight up in the air to perch near the top of a giant long-leaf pine, and I have noticed that some individual birds learn to employ this high flying regularly in preference to a long flight with the covey to some distant thicket.

It is the cock bird which whistles "Bob, Bob White" at mating time, the little hen using a call of two notes which is practically the one all the old birds use for a rallying signal during the months when they try to keep together in a covey. And yet, when there were no cock birds, I have heard a hen bird whistle "Bob White," in fact *seen* her do it. It was much less loud than the cock's call, but otherwise a perfect imitation. In the mating season anyone who will keep still can bring a stray cock bird to him by answering the bird's "Bob White" with an imitation of the hen's whistle. Trustfully, eagerly the little bird runs or flies towards

the call, stopping, with raised crest, to whistle his "Bob, Bob White" again and again, when he fails to find the fair siren he expected.

When the covey is scattered in the autumn or winter time, the birds hide until they think their enemy has gone away, then whistle to locate each other. I often wonder how it happens that they all run or fly to the same place. Each bird seems to be making the same whistle, yet they all acknowledge one as the leader and go to him. Twice I have seen the leader and noted that it was a hen, possibly the mother of the majority of the covey, but I do not know. Also I have noticed that the first bird to fly, when the covey is disturbed, is usually a hen.



ABOVE

Quail nest and eggs. Note that the natural covering has been removed to make this picture possible.

CENTER

Quail just hatched—a small handful.

RIGHT

Young quail getting their first look at the big world.

In the gunning season many quail are wounded in the wings, but escape by running and hiding. If a cat, a fox or other enemy does not catch a winged bird within about two weeks after the injury, the wing will usually have knit sufficiently to permit the bird once more to fly when necessary. Three cripples of this kind, which I kept in an enclosure for a time, were all flying in two weeks, the broken bones having been crudely joined together by a mass of new bone matter. In "throwing" this new bone, the birds drew upon their vitality until very thin, but afterwards they gained weight rapidly and in the following spring built nests in the enclosure. I removed one clutch of seventeen eggs and one of twenty-two, a third large clutch left with the birds being destroyed by rats when half incubated and before I counted it. The two hen birds seemed to use the same nest.

The first two clutches I set under brown cochin bantams and they hatched very successfully. I noticed that the little birds all seemed to chip their shells at the same moment and to emerge together as if by signal. In two hours all were dry and swarming about the hens. It was, however, apparent that the clucks and other signals of the foster mothers meant nothing to them. They ran about wildly and were only reared by being kept in small enclosures from which they were never allowed to stray. Those that found a way out were not seen again. The bantams, however, evidently regarded them as their very own.

When the youngsters were about the size of sparrows they could make small flights and hide in a wonderful way; yet they retained their shrill baby voices and usually betrayed their whereabouts by peeping almost immediately after being scattered. This peeping would bring the barnyard cat to the spot on the full run.

From the day they were hatched the youngsters were fed on well-crumbled hard-boiled eggs, bread crumbs, and finely ground mixed grain, but much natural food was unearthed for them by the indus-

trious scratching of the faithful hens who mothered them until they were about half grown. Their voices had then changed and they were using the covey call; indeed they often called stray wild quail to their pen.

I found that in keeping quail of any size it was necessary to have the floors of the pens covered with brush to keep the birds from flying up in fright whenever approached and hurting themselves against the wire. Their flight was so swift that they hit very hard. Nor could they be tamed.

The experiments I tried convinced me that the common cat is today their worst enemy. A cat hunts them morning, noon and night and becomes expert in sneaking upon the feeding birds or lying in wait where they must pass. The most dangerous time for them is in the very early morning when they usually run to water and then start feeding before there is really full light. Towards noon on sunny days they select a dry place, preferably near cover, and rest there through the brightest hours of the day, keeping so still that even a passing hawk sees nothing. Like chickens, they rid themselves of lice by bathing in fine dust, each covey having a regular bathing place such as an old road where dust is plentiful.

In wet weather and on mornings when the dew lies heavy in the fields, quail drink the drops they find in the grass instead of going to a stream or pond for water. They do not mind ordinary light rains, but always take to cover when a real downpour begins, holding their bodies almost straight up and down to allow the water to run off them more readily.

I have seen quail swim quite fast when wounded over water. Their legs are so powerful that they can jump nearly three feet into the air, this always being done from a crouching position. No wonder they often escape the pouncing fox!

Perhaps the strangest thing I ever saw a quail do happened in New Jersey. A dog I had with me found a small covey in an old orchard near a burned house, the walls and chimney of which alone were standing. The birds flew to this ruin and hid under thick briars in the interior. When again flushed they scattered in all directions, but one flew up the high chimney and came out at the top no worse for his trip!

Another strange bird was one of three left in a covey after the long gunning season had nearly ended. Evidently it had been shot at until actually afraid to fly, poor thing, for when a bird dog pointed the lonely three, only two arose. The setter, an old, experienced dog, knew there was still a bird on the ground and continued to point. I felt curious enough about the dog's action to hunt for that bird for fully ten minutes, first walking around, then looking for it on hands and knees in a perfectly open place covered only by dry leaves. The strangest part of all was that even the dog could not locate it exactly, although the old fellow knew the bird was somewhere within a radius of about a yard square. It ended by my almost kneeling on it, whereupon it flew away suddenly from beneath me with a great roar of wings. I believe that the old dog felt as foolish as I did; what that bird did to hide itself is still a mystery to me.

Bob White is certainly gifted with speed, strength and cunning as well as ability to hide, and with a little encouragement and protection can live happily close to our homes, always interestingly wild yet also strangely trustful.

(CONTINUED FROM PAGE 208)

A Stranded Whale

thing of the past, and many Pacific stations are being abandoned. The principal region remaining profitable is the Antarctic, where in 1923 about 618,000 barrels of oil are reported to have been taken. More than half of this was taken by Norwegian vessels, showing that the originators of this industry still hold their supremacy, while the British took more than 200,000 barrels.

The flesh of whales is an important article of food, especially in Japan. It was also eaten extensively by some of our native tribes, notably by the Indians of the northwest coast, who killed the huge creatures from large dugout canoes. The meat is coarse in texture, but is tender and well-flavored, reminding one of lean beefsteak.

The blue whale, one of our largest species, sometimes reaches a length of 80 or 85 feet. The opened mouth of one of these monsters is so large that 10 or 12 men can stand upright in its cavernous depths, yet the throat measures only about eight inches in diameter. The usual food is small crustaceans, and several barrels have been taken from the stomach of a medium-sized individual.

The so-called whalebone is a special modification of the tooth structure, and consists of a series of horny plates lining the mouth on either side, and terminating in a series of overlapping flexible fringes. In feeding, the whale takes into its capacious mouth a great quantity of water abounding in these crustaceans. The animal then expels the water through the great strainers formed by the fringes of "bone," retaining the luckless prey which it has captured.

The single young whale remains for several years with its mother, who displays ceaseless vigilance in protecting it from enemies.

Saving the Big Game of Mexico

President Obregon's Surprise to the Friends and Foes of Sheep and Antelope

By WILLIAM T. HORNADAY
Director of the New York Zoological Garden

ON AUGUST 1, 1922, the mountain sheep and prong-horned antelope of Mexico were so fiercely beset by hunters that their speedy extinction seemed fixed and certain. The only question about it was: Which hunters are the most deadly—the American sportsmen or the Mexican meat hunters? Both elements were proving serious factors.

And now, by just two turns of fortune's wheel, all that has been changed for the better. The Mexican Government's coup is so gratifying that the story of it is here recorded.

Be it known that the mountain sheep of Mexico happen to be particularly interesting to some zoologists. They represent the most southerly outposts of the genus Ovis in its march southward from the Asiatic-American crossing at Bering Strait. In northwestern Mexico the sheep migration was finally stopped by desert barrenness, fierce heat and scarcity of water. On one Mexican sheep group these conditions have scored heavily and produced a colony of dwarfs.

WORLD'S RECORD HEAD OF LOWER CALIFORNIA MOUNTAIN SHEEP

This head was secured by George H. Gould of Santa Barbara, California, and presented by him to the National Collection of Heads and Horns.

The fauna of Mexico still contains three species of mountain sheep. That one which lingers on the brink of extermination in north central Chihuahua, on the Santa Maria River and Lakes, is Ovis mexicanus, or the real Mexican sheep. This is a sheep of good size, with fairly abundant hair, an extra long molar tooth-row, and extra large ears.

In northwestern Sonora, inhabiting a triangle with a base fifty miles long on the international boundary, and extending down the east side of the Gulf of California to the Seri Mountains (opposite Tiburon Island), there lives a small-sized and isolated contingent of the regulation Rocky Mountain big-horn (Ovis canadensis)—one-fourth smaller than the northern stock, with short, harsh coat of a chocolate brown color, and an almost naked tail. The horns of these dwarf sheep are of standard form, but noticeably smaller than those of the robust Montana-Alberta type. We met these sheep in their home, became personally acquainted with them, and found them to be the most hardy and persistent sheep in the world. Just how they manage to live in summer on the awful Pinacate lava field is a mystery; but they do it, and possibly think that they are even happy there.

Upon the mountain backbone of the Lower California Peninsula, from the San Pedro Martir Mountains southward to La Paz, but no farther, there lives a third species, the Lower California big-horn, named, by D. G. Elliott, Ovis cremnobates. This sheep is somewhat larger than either of the other two, and occasionally its horns attain fine proportions. For it the first-record-for-the-world is the grand head shot by the late George H. Gould, of Santa Barbara, California, and presented by him for display in the National Collection of Heads and Horns.

The following are the measurements of the finest heads of the three Mexican sheep species that are known to me:

	Mexican Sheep	Pinacate Dwarf Sheep	Lower Calif. Sheep (The Gould Head)
Length on the curve.....	35″	39″	42½″
Basal circumference.....	15⅞″	16″	16¼″
Greatest outside spread..			25¾″
Distance between tips....	20″		
	Santa Maria River	Sierra Rosaria	N. E. San Pedro Martir

PHOTOGRAPH BY JOHN M. PHILLIPS

DWARF SHEEP ON THE BASALTIC LAVA OF THE SIERRA PINACATE

Many clumps of white brittle bushes and two dwarfed giant sahuaros are to be seen. Vegetation is rare in this desolate country, but the small sheep are the most hardy and persistent in the world.

The Mexican mountain sheep of Chihuahua never were very numerous (at least during recent years), and even when Dr. Merriam described and christened the species, in 1901, it was next to impossible to procure museum specimens, because of their rarity on the hoof. It was only after five years of correspondence that we were luckily able to procure, through the alertness of Mr. Ben Tinker, the head listed above, which came from the Santa Maria River region. I know two American sportsmen who went hunting to the Santa Maria Mountains and found not one sheep.

The sheep of Lower California have been known and diligently hunted for more than twenty-five years. George H. Gould, Fred W. Norton, Wilson Potter and many other Americans whom I cannot name, went in from Calexico with Captain Funcke, from Magdalena and other places, and secured good trophies. In some places, and by some men whose names I do not know, there was genuine slaughter of sheep, and the wonder is that any sheep now remain alive in Lower California.

Nevertheless, there are a number of surviving bands, and if *all* shooting is resolutely prevented during the next nine years, the Lower California big-horn will be saved to the fauna of Mexico. That species is so fine that its loss would be deplorable; but we are now sure that the Government of Mexico will protect it from going into the discard. Game wardens are needed at Calexico, El Centro and Magdalena, to prevent hunting parties from organizing and departing for the southern mountains in which sheep might be found; and any Mexican citizen may well consider it an honor to be so appointed.

The prong-horned antelope of Mexico may be described as a smaller, less robust and small-horned race, inhabiting the plains regions surrounding the mountains of northwestern Mexico that still contain mountain sheep. The exacting zoologist may regard this brief statement as quite insufficient, and were we writing a treatise on the antelope species it would be indeed so; but as a one-sentence definition it is the best I can offer. At all events, however,

PHOTOGRAPH BY JOHN M. PHILLIPS

DWARF MOUNTAIN SHEEP RAM ON THE LAVA OF SIERRA PINACATE

Just how the animals of this small-sized and isolated contingent manage to live in summer on this awful lava field is a mystery, but they do it and possibly think they are even happy there.

we know that in northwestern Sonora it is literally true. But alas! The prong-horns of Mexico are even fewer in number than the sheep. In 1907 we found not more than a score of antelope, all told; but of sheep we saw at least three times that number. They were living on the level deserts east and west of the Pinacate Range, and the three that we took fell on plains of lava and volcanic ashes.

It is an unfortunate fact that in the breast of the standardized American hunter of big game, the love for mountain sheep hunting amounts to a ruling passion. He will go to the gates of the infernal regions, if necessary, to have his fling at sheep hunting and bring back the head of at least one "big ram." And considering all the fascination there is in hunting grand game amid grand surroundings, I do not blame him! In 1907, we, also, were among those present when Dr. D. T. MacDougal, Director of the Desert Botanical Laboratory, led an exploring expedition from Tucson to the Sierra Pinacate. We wished to know (1) whether any mountain sheep were there, and if so (2) what they looked like at that jumping-off place of the genus Ovis.

We found sheep there. We took away half a dozen good specimens; and the only bad thing that we did was to make a book about that country—which at once set in motion a long procession of sheep hunters headed for Pinacate. I think that at least twenty parties have hunted there since that fatal red-covered book appeared. With but one exception—a party from California, that slew sixteen rams, ewes and lambs—all the American sportsmen who went there shot sparingly, as gentlemen should. I now recall Captain Kermit Roosevelt, W. B. Mershon, Gustavus D. Pope, Carl Lumholtz, Charles Sheldon, Charles A. Gianini and the Dracopoli brothers (from England). The cairn that I built on the summit of Pinacate in November, 1907, to contain our record, is now said to hold a large collection of visiting cards.

And all this while, Charlie Foster and other Mexican sheep hunters diligently have been hunting and killing sheep in that country, for meat. Several large piles of mountain sheep horns—all the work of Mexicans and Papago Indians—have been reported by Mr. Tinker. It is not strange, therefore, that Mr. Charles A. Gianini, who went hunting in 1921 in the Sierra Pinacate, found *no sheep whatever* in that range! Whether any sheep are there today, we do not know; but it is at least doubtful. In that event, we can only hope that bands will migrate into that range from somewhere else and populate it once more.

On January 1, 1922, the outlook for the mountain sheep and antelope of Mexico looked black indeed. The efforts for sheep protection that we made in 1908 with Secretary Olegario Molina, of the Government of Mexico—and up to the overthrow with excellent prospects of final success—completely lapsed when the Diaz Government was replaced by that of Madero. But we are familiar with "the darkest hour."

About August 1, 1922, the most distinguished zoologist of Mexico, with his little daughter Lucy as a companion, came to New York City, to spend

THE FAMOUS PAPAGO TANK IN FLINT-HARD BASALTIC LAVA

The best of the only two water holes west of the Pinacate Mountains, containing water that is clean, clear and good. The mountain sheep live in this kind of desolate and unpromising country.

a month in studying some of its institutions. Professor Alfonso L. Herrera, the dean of the biologists of Mexico, is a distinguished man. He has made his mark as a zoologist and botanist, author, teacher, founder and director of scientific institutions in Mexico. His title is Director of the Biological Studies of Mexico, and under him are the National Museum, the new Zoological Park, Aquarium and Botanical Garden.

Being one of those now rare survivors of past times — an "old-fashioned naturalist"— Professor Herrera is interested in practical zoology and wild life preservation. During the week that he spent in the Zoological Park, we spent hours in discussing the present status and the future prospects of the fauna of Mexico. We put up a special plea for prompt measures that would save the mountain sheep and antelope of Mexico from complete extermination. Professor Herrera solemnly promised that he would do everything that he could to accomplish that end. "But," he added regretfully, "I fear that nothing can be done until the Mexican Congress again reassembles. That will not be until next winter" (1923). It was pointed out that this would mean another six months of sheep and antelope hunting, with terrible results to the remnant bands of those vanishing species.

DWARF MOUNTAIN SHEEP RAM

This animal is here seen on the black lava of Pinacate, as immortalized in a painting by Carl Rungius.

Vowing to the last moment, "I will do my best," Professor Herrera left for Mexico about September 10.

On October 3, 1922, we were thrilled by the receipt from him of the astounding news that on September 30, President Alvaro Obregon had signed two separate decrees granting ten years of absolute close-season

protection to all the mountain sheep and antelope of Mexico, and that the decrees actually became effective on October 1! The proclamations prescribed, as punishment for their infraction, fines ranging from $50 to $500, or the alternative of fifteen days imprisonment, for first offenses, with double penalties for second offenses.

The above delightful decrees have been supplemented by another making Guadalupe Island a perpetual wild life preserve—which saves the elephant seals thereon; and still more recently (May 28, 1923) by another giving five years of protection to

HEAD OF PINACATE DWARF BIG-HORN

A large specimen owned by Ben H. Tinker who now protects those small remnants which have survived.

the deer of Cedros Island and those living on the west coast of Lower California.

Here in the United States a five-year close season is a desperately difficult thing to achieve. Some state conservation commissions which have been given the power to declare long close seasons for vanishing game refuse to exercise it. In taking drastic measures in behalf of imperiled wild life, we Americans are timid, vacillating, too wise, too judicious, and entirely too slow on the draw. Often and often, by the time we have conceived an idea, incubated and hatched it out of its steel-clad shell, the species to be benefited is dead and gone. Yes; I can give a score of examples, whenever I choose; and I can prove that too much "judgment" often is a dangerous thing for wild life.

The swift and far-reaching action of President Obregon was a delightful surprise. It was as re-

MEXICO'S MOUNTAIN SHEEP AND ANTELOPE

The remnants exist within the three areas shown by dotted lines, but only in very small and widely scattered bands.

freshing as a mountain breeze in August. "There," said we, "is a Man Unafraid! God send to the wild life of America a thousand men like him!"

On looking over the cards as they lay face up on the table last March, several facts stood forth and impressed our alleged mind.

In the first place, the Government of Mexico now has many irons in the fire, in setting that nation's affairs in order after years of grave disturbances. The zoologists of Mexico are busy founding their new Zoological Park, Aquarium and Botanical Gardens, and in placing the fisheries of the nation on a better basis. It is perfectly certain that nothing but live men can or will *enforce* the decrees for the

PHOTOGRAPH BY JOHN M. PHILLIPS

AUTHOR AND DR. MacDOUGAL MEASURING THE RAM SHOT BY JOHN M. PHILLIPS

There are a few surviving bands of these mountain sheep and if all shooting is prevented for nine years they will be saved to the fauna of Mexico. The outlook in this respect is promising.

protection of the Mexican sheep and antelope. It is quite possible that just at present the Mexican Government will not feel like putting up new money for a new line of game wardens to reach from Sonoyta to the Pacific coast.

The answer was clear. It was the duty of the Permanent Wild Life Protection Fund to show its faith by some works. In Tucson, Arizona, a man was found, and a plan was worked out.

Mr. Ben H. Tinker, of Tucson—young, keen, capable and courageous—was for about *fifteen years* an acceptable guide for American hunting parties going into Mexico to hunt sheep and antelope. He is good to look at and to listen to. Instead of grouching over President Obregon's decrees, he instantly and loyally accepted them, and informed all negotiators for new hunting trips that "It is all over in Mexico." And without losing a day he entered the service of the Southern Pacific Railway at Tucson.

Would Mr. Tinker care to take on the job of really protecting the sheep and 'lopes of Sonora, for a consideration? Assuredly he would; and he would guarantee to make a thorough job of it—no cure, no pay. He knows every desert, water-hole, tank and mountain range, and every band of sheep, as no other living man knows them. He can pack, ride and shoot; he is a good mixer, and he makes no enemies unnecessarily.

The Government of Mexico, through Senor Dn. Ramon P. De Negri, Secretary of Agriculture and Fomento, and Senor Carlos Lopez, national protector of game, appointed Mr. Tinker as its honorary game guardian for the enforcement of the new game laws in the State of Sonora. He was clothed with authority to arrest violators of the law, deliver them to the nearest Mexican court of justice, and also to call on civil officers for all needed assistance in such work. At present the Permanent Fund meets the cost of that service.

Mr. Tinker entered upon his duties on October 1, 1923, fully equipped to make good, everywhere throughout northwestern Sonora. He is assisted by an extremely capable Papago Indian from Pozo Serna, who also has been a guide for sheep hunters in Mexico. With an automobile, and also a pack outfit, those men are regularly patroling every foot of the international boundary from Sonoyta to the Colorado River, a distance of 150 miles; and it is a safe guess that no hunting party will enter or operate in the sheep country without their knowledge. Inasmuch as there are now *no deer alive in that whole region,* there will be not a shade of excuse for big game hunters to enter that region on

the pretext that they are searching for big game.

But Mr. Tinker believes that no Americans will desire to cross the boundary for hunting contrary to the decrees, and that none will attempt to do so. As for Mexican hunters, he is of the opinion that as soon as they become convinced that the decrees are to be effectively enforced, they will accept the situation, and refrain from hunting as the law directs. As for the Permanent Fund, nothing

ON DUTY IN THE SHEEP COUNTRY OF MEXICO

Ben H. Tinker, of Tucson, Arizona, Honorary Game Guardian for Northwestern Sonora, Mexico.

would give the trustees greater pleasure than a complete absence of lawbreakers.

Concerning Lower California, it is safe to predict that Senor Lopez will be enabled to take all the measures that are necessary to enforce the law throughout the whole of that peninsula. It is perfectly certain that President Obregon is not a man who will ever permit his decrees to be in any manner flouted or ignored. We, therefore, look forward with confidence to the practically complete immunity from slaughter of the mountain sheep and antelope of Mexico for at least ten years from the memorable date of October 1, 1922.

One of the functions of the Permanent Wild Life Protection Fund is to express its appreciation of successful efforts toward the preservation of vanishing species. As a gesture of that kind it has established a substantial token. It is now some months ago that the trustees awarded the Fund's handsome gold medal "For distinguished services to wild life" to President Alvaro Obregon, and another to Professor A. L. Herrera.

PROFESSOR A. L. HERRERA

Director of Biological Studies of Mexico. In the valley of Mexico, collecting for the Mexican National Museum.

It is now a satisfaction to report that Mr. Tinker's work has been, and today is, satisfactorily effective. His surveillance of the hunting field inhabited by sheep and antelope seems to be thorough. Between October 1 and December 15 he visited the camps of 26 hunting parties in and around the following mountains: Sierras Viejo, Picu, Rajon, Joboja and Coloral, and on the Rio San Ignacio. All those parties claimed to be hunting mule deer and white-tailed deer. Eleven of them knew nothing about the new law on sheep and antelope, and Warden Tinker reached them in time to prevent illegal hunting of those species.

In the Pinacate region, Sierras Pinacate, Blanco, San Francisco and Pinta were searched, and four parties were found who had come in to hunt sheep and antelope—the only game to be found there. They did not know of the law protecting those species, and fortunately had killed none, because they were found before they began to hunt. On being informed of the law they willingly abandoned their trips, and left for the American side of the

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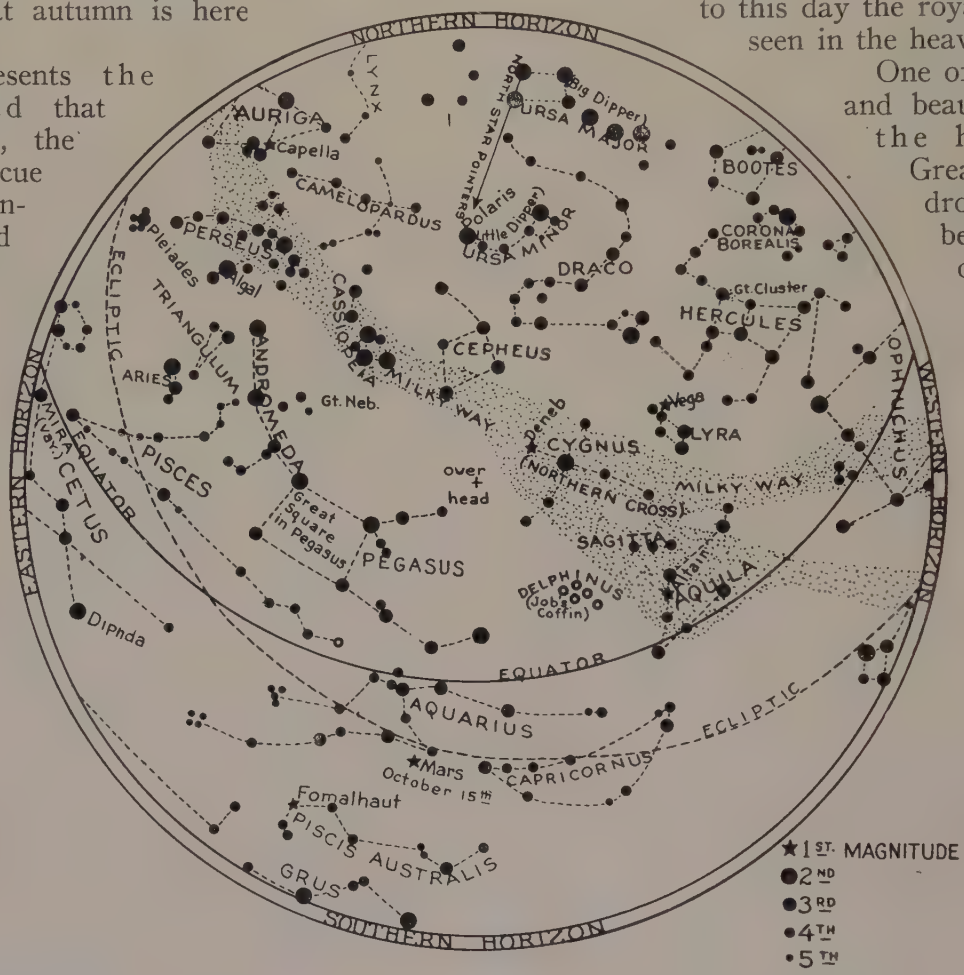
The Evening Skies in October

By ISABEL M. LEWIS

WHEN the nuts are rattling to the ground and the birds are flying southward and it's apple-picking time, high in the eastern heavens on clear, frosty evenings appears the Great Square in Pegasus, and over in the southeast shines the bright white star, Fomalhaut, in the constellation of Piscis Australis, the Southern Fish, infallible signs that autumn is here again.

Pegasus represents the Winged Steed that brought Perseus, the hero, to the rescue of the maiden Andromeda, chained to the rocks to be devoured by the sea-monster, Cetus, who even now is rearing his huge form above the eastern horizon. Cassiopeia, beautiful wife of Cepheus, king of Ethiopia, as the legend goes, offended the sea-nymphs by her vanity in comparing herself to them in beauty. Enraged, they sent a frightful monster to ravage the coast of the kingdom and, according to the oracle, the only way to avert disaster was to chain their daughter, Andromeda, to the rocks to be devoured by the monster.

Perseus, flying through the air on his Winged Horse, chanced to see the maiden below chained to the rocks and the monster approaching to devour her, and he hastened to the rescue, so fast, the story goes, that his steed stirred up a great dust which we see in the star dust of the Milky Way. After a terrible conflict the hero succeeded in slaying the monster and rescuing the maiden, who later became his bride. At their death, the legend continues, they were raised to the heavens and the faithful Pegasus as well. Cassiopeia, by way of punishment for her vanity, was bound to a chair and was compelled to swing continuously around the pole with the King Cepheus at her side opposite to the Great Bear, Ursa Major. And there to this day the royal group may be seen in the heavens.



One of the most noted and beautiful objects in the heavens is the Great Nebula in Andromeda, which can be seen even without the aid of the telescope as a faint, hazy patch of light in the position shown on the chart. It takes the most powerful telescopes in the world, though, aided by photography, to bring out all the marvelous beauty of this object, which is a spiral nebula of enormous size so distant that its light, traveling 186,000 miles per second, takes hundreds and possibly thousands of years to reach the earth. It is still unknown how far away this Great Nebula is, but it is at least more distant than the nearer stars, so our entire solar system, several thousand million miles in diameter, would be but a speck in its midst.

The constellation of Perseus is in one of the most brilliant parts of the Milky Way, and it has been said that there is no finer region in the heavens to explore with a fieldglass or small telescope than that immediately surrounding the brightest star in this constellation, the second magnitude star known as Alpha Persei. It is well worth while to sweep the

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DOWN THROUGH THE TOWN TO STUDY IN THE FOREST BEYOND

School children on a pilgrimage into Nature's home to learn to love the forest and to know what it means to their country.

Nils Carlson, Forester

By NELSON COURTLANDT BROWN

Commissioner in Europe of the American Tree Association

"IN THE forest live the birds and animals. Its trees protect the hillsides. They guard the stream and the fish within it. They give us wealth and health."

Ruddy, blond Nils Carlson stood on his sturdy little legs before the class. It was the hour for reading exercise. He clutched the grade reader in his chubby hands, and his blue eyes sparkled as the words made pictures of the woods and the wild. Yet many of his youthful classmates were not watching or following him. Instead, they were looking out of the window across the small Swedish town at the foot of the hill; out beyond the church with its turnip-like steeple; out toward the range of hills where pine and spruce grew thick and strong, beckoning them to be friends and to play.

Nils read well, particularly well when he read of the forest and nature. But why not? Was not big Franz Carlson, his father, one of the more than a score of county foresters, giving advice in his district, talking forestry and conservation to the people, teaching now and then in the schools? Was not his hearty, sun-tanned uncle Helfrich in Stockholm one of the three forest engineers of the Swedish Forest Service? Had not his aunt Hilda graduated with high honors in nature, botany and forestry from one of the fifteen state training colleges for teachers in the elementary schools?

So when Nils read of the out-of-doors, he read with a swing. Though only twelve, he knew that the forests and the mines were his country's life-blood. He could tell you that more than 60 per cent of the value of her exports were in products of the forest. He knew that 55 per cent of the one hundred million acres of Sweden are growing, productive forests; that for every one hundred of his people there were three hundred and ninety-two hectares of forest compared with seventy-four for all Europe and twenty-two in Germany; that three-quarters of Sweden's forests are in private hands and two-thirds of these are owned by farmers and small holders.

Probably most of the members of the class knew these facts as well as Nils. They had been learning

under that educational system with which is entwined the forest, its vitality and beauty. They had been given a love of wild flowers and plants. They were learning botany, geography, history and sciences, often through the eyes of the out-of-doors. Frequently their grade readers were simple forestry textbooks, such as Nils was reading. They had already acquired a background of forest and nature, finding both entering daily into their lives. So it was not lack of interest that drew eyes away from Nils as he read; it was the approach of the end of classroom work for the day, when the teacher would take them down through the town to the woods beyond for the study of trees and their habits, a study required of all students in elementary and high schools between the ages of eight and nineteen.

SWEDISH CHURCHES FORUMS FOR FORESTRY TALKS

The people of a Swedish town returning from one of the many meetings addressed by the State's foresters.

AT FARMERS' GATHERINGS FORESTRY IS DISCUSSED

Play is joined with work at the week-long meetings where the Forst Mastares talk forestry to the man who tills the fields.

Near the woods beyond the town was a half hectare of land where the class would stop with avid interest. Here they had planted a variety of little gardens—one of flowers, another of vegetables, a third of young forest trees, and, in one corner, several fruit trees. They were theirs to watch. They had weeded them and tended them. They were vain of their neatly laid out home garden in one part of the plot, and a little sorry for the school children in the northern provinces who missed this fun because of the late spring.

A few kilometers into the woods was a free vacation camp where the poorer children of the cities came each summer to meet nature in the mountains and forest. It was one of nearly one hundred to which the city of Stockholm had sent nearly 2,500 of its young citizens last year. It was like many near other larger cities.

"It is the duty of every girl and every boy in Sweden to protect the forest. If there are fires he will be a poor man. It will be the forest that gives him work and play when he is older."

Nils closed the book and slid into his seat. There was a shuffling of readers and a scuffling of feet. Eyes glistened at the thought of escape to the needles and cones of the forest floor. Youthful but worthy countrymen and women of Linnaeus, the great Swedish botanist who has given his name to many trees and plants, were about to start adventuring in nature as he had adventured through his life.

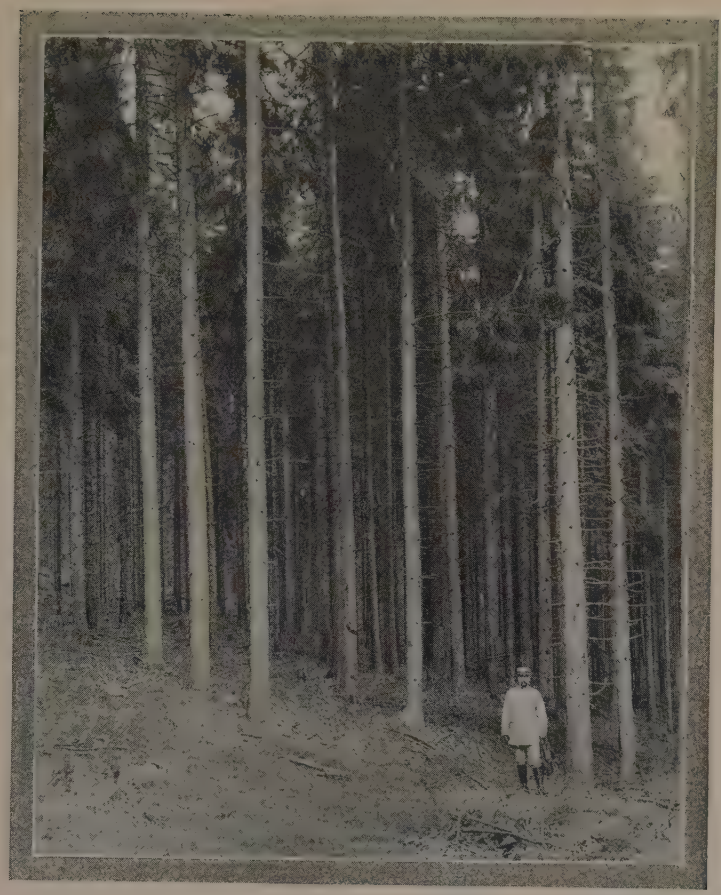
That night, when dinner had been cleared away,

and the forested hills were purpling, Nil's father lit his long-stemmed pipe. Thomasson, the Forst Mastare who was lecturing at the farmers' gathering this week in town, as other Forst Mastares were lecturing throughout the country, was with him.

"You have been in the forest today, Nils?" his father asked.

"I have, sir," Nils replied.

"The boy is bound to enter the service, Thomasson," Franz Carlson said, turning to his companion. "He loves the forest well, as do most of us, I should think. This last planting day he won a medal for setting out forty-three trees. His school alone set out 18,000 young pines on that bad burned land above the river."



NILS' VISION WAS TO GUARD SUCH TREES

Tall, straight, eighty-year-old spruce, meaning prosperity and eternal industry to Sweden and her people.

As the two men smoked and talked, Nils listened, his arms wrapped about his knees. He felt very happy as they discussed his future. Some of the boys in the town, when they were fifteen and had completed the required school work at the Folkskola, would go into a trade union and work, perhaps in the woods or sawmill. But Nils would go on at the laroverk—the preparatory school—until he was eighteen and had won the white cap of student. With this he could go to any university or college. His father talked of the Royal Swedish College of Forestry at Stockholm, with its nearly one hundred years of glorious service, its laboratories and experimental areas. Nils pictured himself as one of the forty students admitted there every year.

Thomasson, himself a graduate of one of the seven state schools, where instruction is free as well as rooms and where students lacking funds are subsidized by bursaries of 250 kroner a year, spoke of these schools. Franz Carlson shook his head. Nils must go to Stockholm where his training would equip him for the varied work of lecturing on forest economy in the agricultural and preparatory schools; addressing meetings of citizens, and advising with timber owners in using and conserving their forests.

"God planted a tree in the hearts of my family, Thomasson," Franz Carlson said. "You know my brother Helfrich in Stockholm. I have two cousins in the service, one on the staff of the Royal College. My wife, perhaps you did not know, I first saw when she was teaching a class in the woods and I was making research for my thesis.

"Most Swedish boys, thanks to our schools, know more of the forest, the trees—how to plant them, how they grow, how to care for them—than many trained foresters in other countries. Nils has it in his blood. The boy was born a forester, and he knows growing life and what it means."

He puffed silently at his pipe. Lights had flickered on in the village. The backbone of the ridge in the west was a dense, blurry blackness against the sky and the early stars. "Come, Nils Carlson, Forester," he said, "to bed and dream fragrant dreams of pine cones and spruce needles."

Turkey and Cranberry sauce!! Before long now Billy and Bob will be dreaming of drumsticks and the tart taste of the bog berry. But where does our Thanksgiving turk hail from? Who are his ancestors and relatives? What is the cranberry, and where does it grow, and how? You will find these questions answered in the next issue of NATURE MAGAZINE*—the Thanksgiving number.*

The Cardinal Flower, a Vanishing Species

By ALBERT A. HANSEN

NOT LONG ago the country was surprised and amused at the newspaper announcement that a cow had been placed in the New York Zoological Garden because there were hundreds of thousands of city children who had never seen a live cow. Astounding as this may seem, I once knew a Philadelphia school teacher who asked a class of forty pupils to identify a cardinal flower, buttercup, clover blossom and a black-eyed Susan, and not a single student could name the cardinal flower. In fact, less than half of the class could identify two of these four familiar plants.

The cardinal flower is one of the most striking of our native wild flowers. No other species can surpass in brilliance the rich, vivid red of its gorgeous clusters of blossoms. There is no suggestion of the modest charm of the delicately tinted hepatica in the coloration of this plant—it is as bold and gay as a peacock. In spite of its startling display of color, the cardinal flower is rightfully regarded as one of the handsomest of our native species.

The cardinal flower, or red lobelia as it is sometimes called, seems to be most at home in rich, moist soil, particularly along the banks of streams, on the borders of swamps and marshes, and in low, wet spots in meadows. The bright vermilion hue seems to be particularly inviting to the busy little ruby-throated humming-bird, upon which it is practically dependent for pollination. The flowers first appear during midsummer and may be found as late as September and October.

The cardinal blossoms are protandrous, meaning that in order to escape the weakening effect of self-pollination, the pollen is first ripened, after which the two-parted stigma opens, exposing the stigmatic surface which is now ready to receive pollen grains from other plants.

A BRILLIANT WILD FLOWER

No other species can surpass the rich vivid red of its gorgeous blossoms.

The dazzling beauty of the blossoms seems to invite picking and all too many have accepted the invitation. As with the cardinal bird, the conspicuous color and rare beauty have contributed so greatly to destruction that the species is now on the brink of extinction in many localities where it was formerly common. The former abundance of the cardinal flower is suggested by Holmes

> As if some wounded eagle's breast,
> Slow, throbbing o'er the plain,
> Had left its airy path impressed
> In drops of scarlet rain.

The virtual disappearance of this handsome species over large areas has taken place in spite of the creeping rootstocks, usually a sign of virile, tenacious plant life. It does seem strange that we should show our appreciation of the beautiful by destroying the very thing

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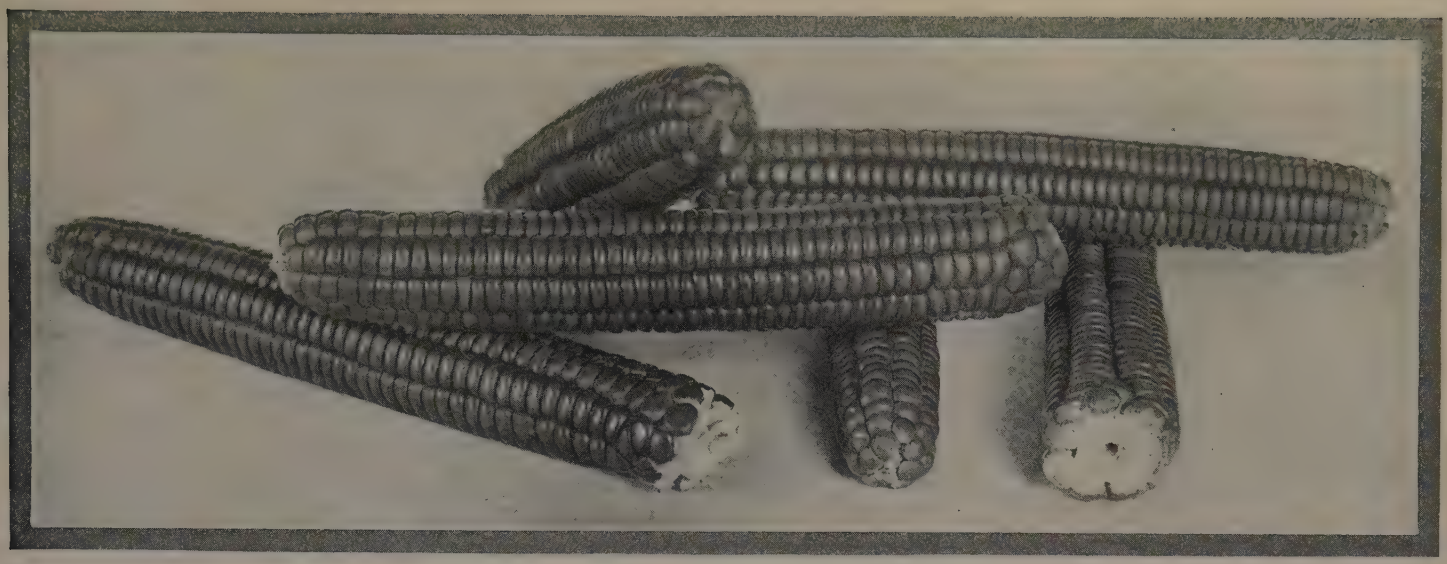


GOLDEN EARS OF HARD-GRAINED FLINT CORN

Hardy, growing well in the cool and rainy weather of early spring, this variety is a favorite of northern farmers for its early maturity.

Gold That Grows

By D. F. JONES

Connecticut Agricultural Experiment Station

SIR WALTER SCOTT in his introduction to Ivanhoe describes the serving of a meal in those twelfth century Saxon-Norman days in England. Flesh of fowls, deer and swine, together with loaves of bread, fruit and honey there were in plenty. But if it should be possible for us of the present day to join in the partaking of such a daily spread, by performing some miracle (such as Mark Twain invoked to place a Connecticut Yankee in King Arthur's Court), we would soon notice the absence from the table of several everyday articles of diet. So accustomed are we to a regular supply of potatoes throughout the year, tomatoes in season, and pumpkin pie in the fall that few realize that these good things were not always available. No incense from after-dinner cigars would be there to complete the meal. It yet lacked some four hundred years before the time of Raleigh who first introduced the use of tobacco into England. Before Columbus sailed west to reach the east, America's contributions to the world's storehouse were unknown to the other continents.

Indian corn, or maize of the people across the Atlantic, to distinguish it from their "corn" which is wheat or barley, would even now seldom be missed from the table. Although considerable quantities of corn are used directly for human consumption it is not for this purpose that corn is grown on more land than any other cultivated crop in this country. The making of hams, bacon and other pork products is the principal use to which corn is put. Nearly half of the total crop is fed to swine on farms. About half of the remainder is fed to cattle and horses.

In the form of silage, corn is one of the principal foods of dairy cattle, and without corn milk would be much more expensive than it is. Silage is simply sauerkraut made out of the whole corn plant instead of cabbage and without the addition of salt. Good corn silage has a pleasantly sour odor and is a most healthful and nourishing food supplying succulent material during the winter.

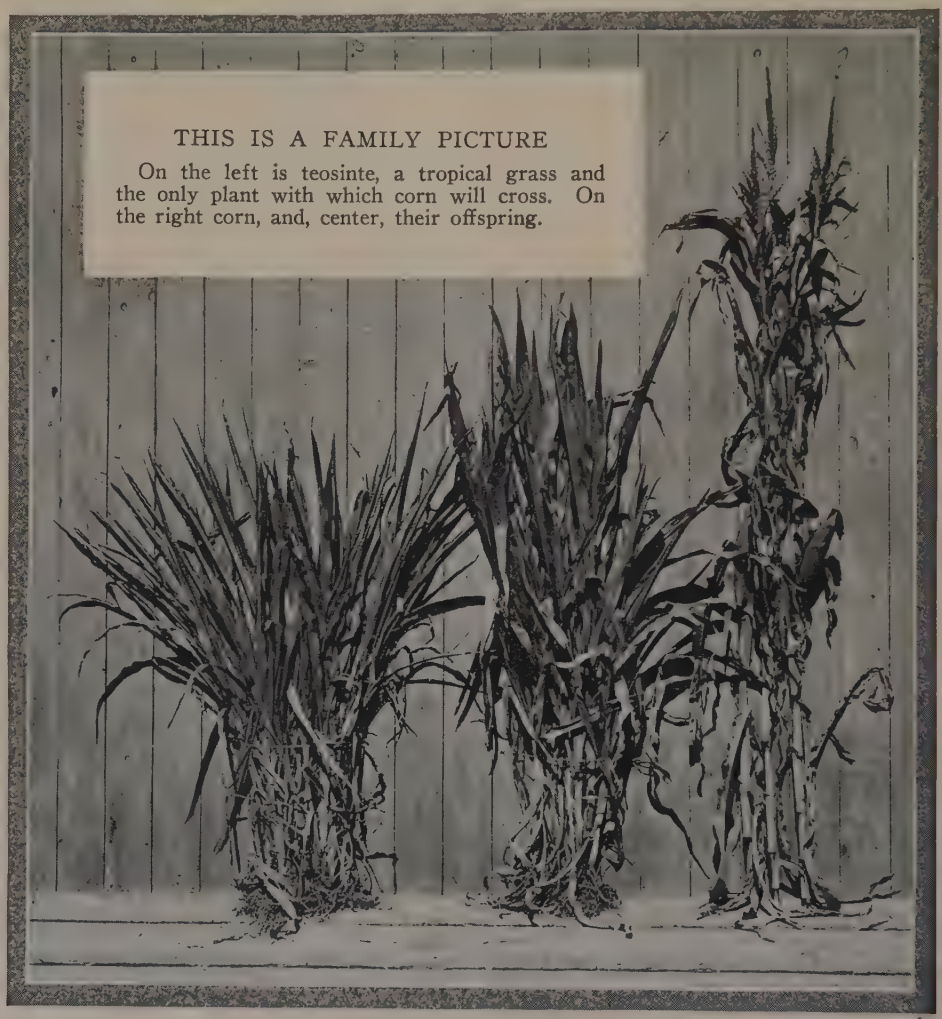
Corn oil, corn syrup and corn starch are increasingly important products and their manufacture will soon rival the meat-packing industry. Barley, 1½ per cent of the corn crop, is exported.

In this country corn brings a greater total return to the farmers than any other crop. During the past decade the product of this plant has generally exceeded the combined value of wheat and cotton, the next two most important crops. Corn growing is the principal task of millions of farmers. About a hundred million acres are planted to corn each year. It is grown in every state of the Union but thrives best in the central states from Ohio westward to Missouri and beyond.

The annual value of the corn crop ranges from one and a half to three billion dollars. This is ap-

proximately two times the annual value of iron produced and 20 times that of the gold mined each year.

Unknown to the world before the discovery of America corn is grown in nearly every country in the world and has even replaced wheat and rice as staff of life in some places. Of the world's four billion bushels of corn the United States produces three-fourths. Loaded in wagons this would make a train long enough to go nine times around the world at the equator. Southern Europe, South America, southern Asia and South Africa, in the order named, contribute most of the remainder. Italy, the Balkan countries, Hungary, Spain and Portugal comprise the region of corn culture in Europe. A large part of the corn grown in Argentina and Brazil is exported to Europe and although the amount produced is small compared to our production the South American grain has an important effect upon the market price of corn.



THIS IS A FAMILY PICTURE

On the left is teosinte, a tropical grass and the only plant with which corn will cross. On the right corn, and, center, their offspring.

The geographic range of corn is determined by temperature, rainfall and length of growing season. It thrives best where the days and nights are warm during the growing season and where there is a moderate summer rainfall. The plant does not succeed in arid regions even under irrigation unless there is rainfall during the period of pollination.

Corn is an extremely variable plant and varieties have been developed to meet very different conditions. In the tropics large-growing, hard-seeded types with the ears well protected by long thick husks succeed best because of resistance to insects which devour the grain. In the north early maturity is of chief importance. There are varieties which will mature seed in less than three months. Larger and heavier yielding varieties are grown for silage in localities where only the extremely early sorts can be ripened.

Corn was the first crop cultivated in America by the white man. The early colonists in Virginia and Massachusetts found the Indians growing corn and preparing it for food in many different ways. Because their own plants from Europe were not adapted to the new conditions the white settlement of America would have been extremely difficult without corn. This plant thrives on newly cleared land, is tilled without elaborate machinery and furnishes food for man, and grain and fodder for animals. Corn was first grown among the charred stumps of burned forests, fertilized by burying a fish in each hill before the seed was planted, cultivated with a clam-shell hoe and eaten as roasted ears or ground into meal and prepared in the form of bread, pancakes or porridge.

How long corn has been cultivated no one knows. That it originated somewhere in the Western Hemisphere there is no doubt. It was not known in Europe before the return of Columbus and no authentic records exist indicating that corn was grown in China or Japan before the voyages of the early European discoverers who carried the grain with them from America.

When first introduced into Europe corn went under various names, most commonly Turkish wheat. But many plants are wrongly named. The

English walnut did not originate in England nor is it commercially grown there. The Jerusalem artichoke is not the true artichoke and neither did it come from Palestine, being also a native of America. The name is a perversion of the Italian word "girasole" meaning sun-loving. As one botanist states "we thus see how much worse a double name is, for if it be single only one mistake is possible."

Corn is found among the relics of the most ancient tribes of Indians. It was cultivated by all the agricultural natives of which there is any record. The only related plant with which corn will cross fertilize is teosinte, a large, semi-tropical grass growing wild in the uplands of Central America and adjoining regions. It is in this country of the ancient Mayas, Aztecs and Incas that the most abundant evidence has been found of the early cultivation of this plant. The Indian names of corn vary among the different tribes but they all come to be more and more alike as the regions approach Central America. We may suppose therefore, with justification, that here is where this plant was first taken from the wild.

What the wild prototype of corn was like we have no direct evidence. No plant has been found truly wild that resembles it and corn as it now is cannot long survive under natural conditions in any country. Fossil ears have been found in Peru which closely resemble varieties now grown there. The antiquity of corn under cultivation has been roughly placed at 20,000 years and it may easily have been cultivated much longer than this. Corn like wheat and rice have been cultivated before history began and have accompanied man from savagery to civilization. In fact, the cultivation of crops necessitating a more or less fixed abode and some ingenuity in devising tools for cultivation has probably been one of the most potent factors in bringing about civilization. Is it any wonder, then, that there is a great amount of interest in the origin of our cultivated crops?

Corn as now grown has several well-defined types. The principal ones are known as: dent, flint, flour,

MAN-HIGH, AND THEN SOME, FOR MANY MILES

Easy to cultivate, harvested without expensive machines and a product of the soil serving us in many ways as food and to produce other foods, corn ranks high among Nature's bounties.

sweet and pop corn. Dent corn is practically the only corn grown for animal consumption in the corn belt. Flint corn is similar to it in composition except that the grains are harder and smoother and do not have the characteristic indentation. Flint varieties are preferred in the northern corn-growing districts because of their early maturity, freedom from mold on the ears and ability to germinate in the cool, rainy weather of early spring. Flour corn is similar in appearance to flint but has the consistency of chalk. It is easily ground into flour and for that reason was probably preferred by the squaws who ground the flour and who likewise sowed the seed. Flour corn is not now grown to any appreciable extent.

BELOW

Ears hung up to dry and to serve to seed the acres sowed to the next year's crop of corn.

ABOVE

The corn that the Pilgrims found the Indians cultivating is still the best that will thrive in the cooler climates.

Sweet corn is characterized by a high-sugar content. In field corn this sugar is largely converted into starch. Well-formed starch grains are not formed in sweet corn kernels. The sweetness of this type makes it much more palatable and that is why it is preferred as a vegetable and for canning. On account of the density of the kernel and the tough hull in which it is enclosed pop corn has the interesting property of expanding enormously when heated rapidly. The popping of corn is simply an explosion of steam and oil vapor held under pressure until the seed is burst and the pressure suddenly released. Corn to pop successfully must have just the right quantity of moisture, neither too wet nor too dry. The most common cause of poor popping is due to drying. Pop corn, when cured thoroughly, should be stored in sealed jars or other air-tight containers.

Many curious types of corn are known. These have no commercial importance but have considerable interest to the botanist, as they throw light upon the origin of the plant, and to the student of heredity as these oddities breed true and reappear when crossed with other types. Little dwarfs grow only a few inches high side by side with normal plants ten feet or over in height. Golden plants are common and pure white seedlings, which cannot live beyond the stage permitted by the food stored in the seed, are frequently seen. These are hereditary defects. All of these help to make clear the process of heredity and only by bettering the hereditary constitution of the corn plant can it be made a more efficient producer.

The Indians, however, were good corn breeders. Varieties grown by them when the white man first came are still being grown in New England and are fully as productive as other varieties maturing in the same time. The white man came to America seeking gold and found Nature's gift of corn.

The Texas Bird of Paradise

By KATE PEEL ANDERSON

(PHOTOGRAPHS BY THE AUTHOR)

SCISSORS-TAIL FLY-CATCHERS

Beautiful in plumage, graceful in flight, it is well known in Texas as the state's bird of paradise.

TEXAS, while recognizing the claim of several sister states to a casual share in the beautiful Scissors-tail Fly-catcher, rightfully feels that this queen among birds, called locally the Texas Bird of Paradise, belongs peculiarly to herself.

From April until October it is with us, enchanting us with its lovely plumage and still more with the inimitable grace of its flight. In winter it betakes itself to still warmer climes, retiring beyond our southern limits into Costa Rica, where doubtless its advent is hailed with the same delight that greets it on its return to us in

THE INDIANS THOUGHT IT A TRANSFORMED RED HORSE FISH

Because of its salmon pink flanks, and its long, bifurcated tail, which made them think it was a reincarnated fish.

the early spring. So beautiful in plumage, so graceful in flight is this loveliest of fly-catchers, that it is no wonder, when it made its appearance in Oklahoma, it made a sensation among the Indians, the Cherokees believing it to be, not a bird at all, but a transformed Red-Horse-Fish, this, of course, because of its salmon-pink flanks and long, bifurcated tail. The Pawnees were equally impressed and at once placed it among their objects of worship, regarding it as sacred. The Mexican Indians attach a weird superstition to it, believing that it feeds upon the brains of other birds.

In brilliant coloring the Scissors-tail is surpassed by many others, although its own plumage is one of quiet loveliness. In the adult, the head and body are almost pure white (in the young, these are the softest, downiest, pearly-gray), with the quills and coverts of both wings and tail, a dark gray, toning into a reddish-brown, with outer feathers of pure white. Underneath the wings a lovely salmon-pink is displayed when the bird is in flight. The young are even lovelier in coloring, for their wide mouths, usually open, clamoring for food, add a strong note of deep orange to the grays and whites and touches of pink. To the layman, the male and female of this species do not differ in appearance in any way, except that the male is a trifle larger and more dashing in manner.

ABOVE Whole insects, large or small, are rammed down the infant's throat.

BELOW The mother bird hovers over its young which, as usual, are insisting upon food.

It is not in coloring, however, that the bird makes its chief claim to charm, but in its exceedingly graceful flight. Rising high into the air from tree or telegraph wire, where it likes to perch, it floats through the air, apparently without effort, opening and closing its long outer tail feathers, by which it seems to balance itself. It seldom lights upon the ground but catches its prey upon the wing as it sails through the air or darting down suddenly to skim some irrigation canal where insects are snapped up remorselessly.

It feeds almost exclusively upon insects, with but a very small proportion of seed and small fruits. Grasshoppers, beetles, even the larger kinds, swallowed entire—wasps, ants and, alas for the bee-raiser, honey-bees in abundance when they are accessible. Its economic value, however, to the farmer, inasmuch as it destroys vastly more harmful insects than good, inclines him to leniency with this one failing.

The birds travel usually in pairs, flying tandem fashion, but occasionally one sees them in flocks. It was my privilege, one afternoon, to see fifteen or twenty playing about an irrigation canal, their base a group of retama trees which grew near the bank. One at a time they floated down to the water, skimming it for insects and splashing the water as if in play, then returning to their base while another took his

RIGHT

Flying from the branch of the tree, with wings and the beautiful tail fully extended.

ADULT AND YOUNG

The older bird has a head and body of almost pure white, and under the wings is a lovely salmon color, while the young are a soft, pearly gray.

turn, watched critically by all the others as if they were engaged in some contest of skill. They seemed to delight in their own graceful, arrowy flight and, no doubt, in bird language which in their case is a fine, zestful hip-se-dee, quite equal in enthusiasm to a college yell, complimented each other upon their skillful execution.

While these birds usually seek open places for nest-building, occasionally they choose sites near dwellings. In a small ebony tree which grows within fifteen feet of my door, a pair built a nest this spring and reared, with a few short but highly exciting interruptions from me and my camera, a pair of beauties.

An opportunity was thus given me for close study of the habits and personality of these birds. After weeks of the intimacy thus brought about, I do not so much wonder that the Pawnees held them sacred.

Such parental affection, such pride in their young, such spirit in protecting them, such jealousy between parents as to which should be most devoted, such grace, such beauty!

The young, often standing upright in their nests, built of coarse grasses with tufts of goat-wool, judiciously placed for protective coloring—with wings uplifted like young penguins and their orange colored mouths wide open for food, await, eagerly, the return of either parent so diligent in attention to their needs. Sometimes both arrive at once and then comes a veritable war of words and frequently a personal encounter between the two, to decide which shall have the honor of feeding them first. The female of the species, it seems almost needless to say, more frequently than not comes off victor.

When I lower the nest in order to make photographs of the family, the air fairly resounds with protests. No sooner, however, is it settled near the

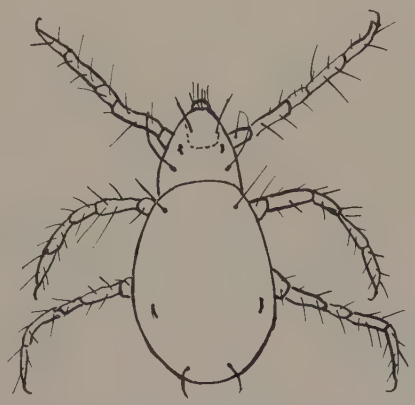
(CONTINUED ON PAGE 254)

The Chigger or Harvest Mite

By EDWARD A. PREBLE

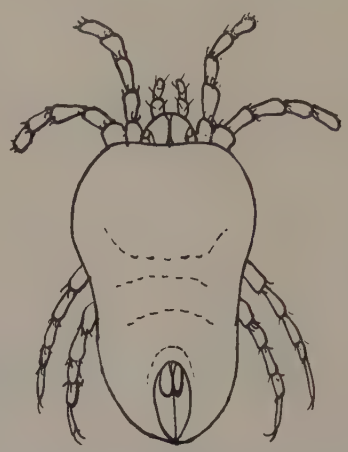
CHIGGERS, as they are generally known, are the tiny mites which, getting under the skin of a person in the woods, causes a painful irritation which annoys the victim for days. The victims rarely, if ever, see the mite and consequently know little or nothing about it except that it hurts.

Those who have suffered may like some information. It is the baby chigger or harvest mite which attacks them, the adult mite getting its food from the bodies of insects and leaving humans alone. Anyone afield in the habitat of the chigger, which includes most woodland and brushy country within its range, between June and September, may become its unwilling victim. The farmer, the fisherman, the housewife herding her chickens or picking a bucket of blueberries or blackberries, the urchin coming from the swimming-hole or hunting birds' nests, even the courting couple exploring lover's lanes or brook-side paths, may dislodge from the foliage of shrub or herb a cloud of these invisible mites. Some will find their way to the skin, and, probably taking the human to be an unusually well-developed and especially luscious insect, will burrow into the tender flesh and proceed to gorge themselves with blood. Unfortunately for the mites, this rich diet seems not to agree with them and they soon die, but not without having dealt an abundance of misery to their victim. The area surrounding the death bed of the young mite becomes congested, the affected part spreading until it covers a circle from a quarter to a half-inch in diameter, or even larger. The interval between exposure and manifest congestion may vary from one to several hours, and the first two days are the worst. After bedtime, when one is trying to sleep, is a favorite time for this resulting feverish state to be brought forcibly to the attention of the sufferer.



THE YOUNG CHIGGER
(greatly magnified)

This, about the size of a small dot, is what gets under the skin of people and causes a painful irritation, lasting for several days.



ADULT CHIGGER, WITH EIGHT LEGS
(greatly magnified)

The adult lives on such insects as plant lice and young caterpillars, which it destroys, and is thus of some service to man.

Different people vary greatly in their susceptibility to this annoyance. Children, and adults whose skin is thin and delicate, naturally suffer most. Many persons, especially those much exposed, and those who perspire very freely, may become almost immune.

When one has a bad case the temptation to scratch is almost irresistible, and this of course only aggravates the annoyance. After a few days the inflammation subsides and a small scab usually forms, which when removed presumably does away with the remains of the tiny pest, but sometimes leaves a scar that may be visible for weeks. So much are these mites dreaded by especially susceptible persons that some can scarcely be induced to expose themselves to attack, preferring to avoid the woods entirely during the summer.

So much about catching them, but how may they be avoided? Sometimes after exposure a bath in hot or salty water may do away with them. The best and surest preventive, however, is flowers of sulphur freely sifted beneath the underclothes from the waist downward, or from the knees down, if one is walking only in low grass or bushes. This substance is inodorous and harmless, and under ordinary circumstances is thoroughly effective. Vaseline or kerosene is perhaps even more certainly efficient in places where the mites are unusually common, as in the south, but soils the clothing and is otherwise unpleasant.

The chiggers, which are also called harvest mites or red bugs in North America, are found in many parts of the world. They received the name harvest mites from the fact that in England and Scotland they are most troublesome in the harvest fields, where they sometimes make the gathering of the crops a serious problem. Harvest mites are found also in western Europe, in Japan, and in the tropics

(CONTINUED ON PAGE 255)

The Arrangement and Photography of Cut-flowers

By WILLIAM S. DAVIS

IT IS natural that nature-lovers should wish by means of cut-flowers to bring into their homes some of the beauty found in garden and field, but to accomplish such an object in a satisfactory manner requires the exercise of good taste, both in the grouping of the flowers and observance of the principles of color harmony.

The first consideration is to avoid too great a variety of colors in one group. Some of the most beautiful effects are obtained by using several shades of a single color, together with enough green foliage to furnish an agreeable setting. When flowers of different colors are combined one should either adopt the principle of grouping colors that blend with one another, such as yellow, orange and scarlet, or combine those possessing complementary colors. If the latter plan be adopted, one might combine yellow with violet, or deep blue with orange. Very striking effects may be secured, but to avoid an excess of contrast one of the colors should be allowed to predominate—only enough of its complementary being introduced to create a "note of accent," which serves to enhance the brilliancy of the whole.

DAHLIAS

The beautiful texture and translucent quality in the petals of certain blooms is best brought out when they are seen against the light.

White being neutral, white flowers may be used with those of any color, so far as the matter of color alone is concerned, but it is possible for them to create a tonal discord if injudiciously introduced among flowers of a very deep color. White may be used with delicate yellows, rose pink, the lighter blues and blue-violets with pleasing results.

To secure complete harmony, the shape, color and texture of the flower-holder should be given as much thought as the color scheme formed by the flowers. The cost of a vase is no criterion as to its suitability. The worst possible type of holders are the heavily ornamented, highly glazed affairs that cry out for attention and draw the eye away from the flowers. On the other hand, plain glasses, small fish bowls, common unglazed jars or bowls of a dull hue, and even bottles of graceful shape make admirable flower-holders.

Flowers of a very delicate tint and texture usually look their best in a glass receptacle, whereas those of heavy texture and powerful color are best placed in some kind of a pottery vase, a stoneware crock or jar often serving the purpose well, espe-

cially for bouquets that are to be set on the floor.

Plants of a naturally spreading type require a bowl or wide-mouthed vase if they are to be exhibited in a characteristic manner, while such as grow upon tall, delicate stems need a slender holder.

Bouquets containing a mixture of colors should either be placed in a glass vase or a pottery jar of a neutral or dull-green tint. A mass of bloom of a single color may be similarly treated, or, instead, a receptacle of the same color as the flowers can be used, but of a softer hue. A holder of a complementary tint may also be employed when a note of accent is wanted, a dull orange, for instance, bringing out the full intensity of deep-blue flowers.

FLEUR DE LIS

A simple background brings out the decorative quality of flowers.

The mistake most frequently made by those arranging flowers is that of crowding too many together. If color rather than form is the outstanding feature of the flowers selected, a certain amount of massing is desirable, but even in such a case a few single specimens should usually be allowed to project beyond the mass to give it a graceful quality. Flowers which are particularly beautiful in shape and texture should always be given plenty of space, so that these features will be brought out clearly. As a matter of fact, a charming effect may often be created by employing a single flower, together with a bud or two and a few leaves. Such treatment is especially effective for long-stemmed flowers that permit of careful grouping, such as jonquils, narcissi, etc.

In arranging a bouquet for use on a table the effect from all sides should be studied, but in the case of one that is to be placed upon a shelf or near a wall one need only consider the decorative effect of lines and masses when viewed from in front. When a group is placed close to a wall the harmony of the arrangement will be greatly enhanced if a plain surface constitutes the background, since the flowers and their stems will then form a clear pattern, free from extraneous details that disturb the eye and mar the decorative effect. When the wall is not of the right tone or color to set off the flowers properly, a piece of plain drapery or a folding screen may be utilized to form an adequate setting. A mirror sometimes makes a good background, providing there are not too many objects opposite to produce distracting reflections. It should also be remembered that in effect the reflection will practically double the number of flowers; consequently it is advisable to keep simplicity in mind when preparing a bouquet that is to stand before a mirror.

The beautiful texture and translucent quality in the petals of certain blooms is best brought out when they are seen against the light, such lighting being obtained by placing the flowers in front of a window. Those that are so dark in tint as to appear dull and heavy in tone in a subdued lighting will appear to fairly glow with light if given a position where the sunshine can play upon them. Indeed, suitable lighting plays a very important part in bringing out the character of all flowers, some needing a subdued light and others direct sunshine. For this reason one will find it both instructive and entertaining to experiment freely with the lighting.

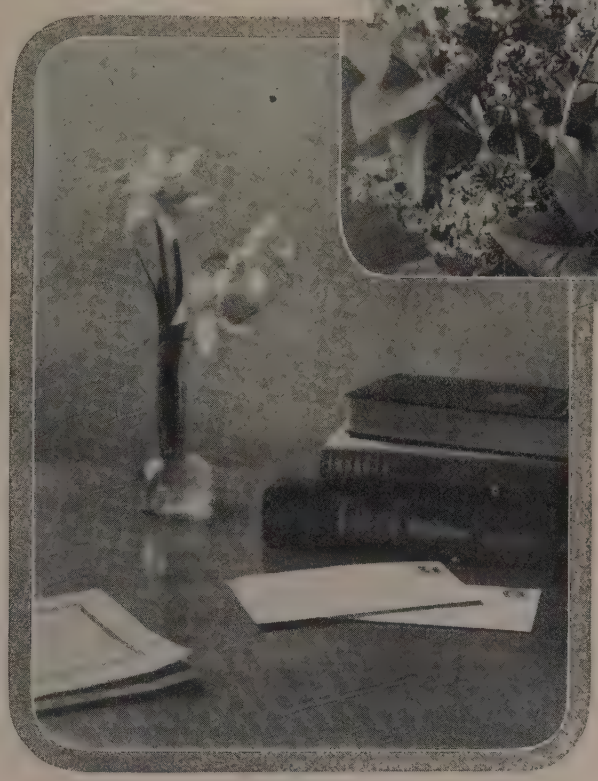
Most of the suggestions given upon the grouping of flowers to render them most pleasing visually apply also to their arrangement for photographic purposes, particularly when the aim is to secure studies of a pictorial character. In making botanical records, however, general effect must sometimes yield first place to such a disposition of individual specimens as will show most clearly the minute detail of different parts, and the characteristic structure. For example, the flowers may be so placed as to show the front, back and transverse formation from a single viewpoint.

Since it is not always desirable to include the receptacle in the picture, one may sometimes facilitate the work by employing a number of tall, small-necked bottles, one for each stem, or a pan con-

taining wet sand or clay, into which the stems can be stuck in whatever position may be desired. Branches of blossoms from trees can be held in their growing position by means of a small iron vise provided with a clamping screw, which permits of attachment to a stand or chairback.

All cut-flowers should be allowed to stand with their stems in water for several hours before photographing, as this gives them time to recover from the wilting that frequently occurs immediately after cutting. When this precaution is not taken some of the flowers in a group may move sufficiently during the time-exposure required to cause blurring of the image.

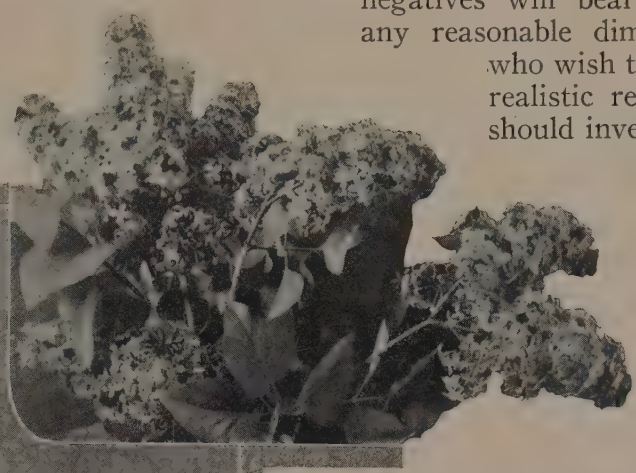
The necessity for employing a very small lens-stop to bring all parts of a group into reasonably clear focus may be avoided by keeping the individual specimens in as nearly the same plane as is practicable without crowding them. Since the length of the exposure, other factors being the same, is proportionate to the size of stop used, it is obviously an advantage to employ as large an aperture as will give the required depth of definition. Keeping the flowers within a shallow depth of field will also prevent their images from being strikingly different in size.



JONQUILS

A charming effect may be created with very little material by emphasizing the beauty of form and texture of individual flowers.

Although fair results may be secured by a careful worker with practically any kind of a camera, a long bellows plate camera is unquestionably the most suitable type. A lens of rather longer focus than is commonly fitted will eliminate the possibility of violent foreshortening, such as occurs when one of relatively short focus is brought too near the subject for the sake of getting a larger-sized image. A good focal length is approximately once and a half the longer way of the plate—i.e., somewhere near 7½ inches for a lens to be used upon a 4 x 5 camera. This size instrument, by the way, is well adapted to flower photography, since a lens of the focal length mentioned will give good depth of definition at larger apertures than the longer focus lenses required by larger cameras; the image is of sufficient size to allow of being carefully focused, and the negatives will bear enlargement to any reasonable dimensions. Those who wish to obtain the most realistic records of flowers should investigate the possibilities of stereoscopic photography, for good stereographs excel any one-lens photograph in conveying a vivid illusion of depth or the third dimension of objects.



LILACS

If color rather than form is the outstanding feature, a certain amount of massing is desirable.

To secure a well-balanced rendition of the relative tonal depth of the varied hues one finds among flowers it is imperative to employ suitable color-sensitive plates (or films) and ray-filters. Double-coated orthochromatic plates will be found satisfactory for all subjects that do not contain deep reds. The latter can be properly rendered only by the use of panchromatic plates or films. In nearly all cases it is advisable to use a ray-filter in conjunction with color-sensitive emulsions. A light-yellow filter, such as the Ingento series A, or a Wratten K1 or K1½, will be sufficient when color contrasts are not excessively strong. Where greater correction is called for the Wratten K2 or Ingento B may be used, or, if panchro, plates be used, the Wratten K3 screen. The latter is, however, too deep for use in conjunction with orthochromatic plates.

Any angle of lighting that gives a pleasing effect to the eye can be utilized, but it may be necessary to have the light a little more diffused to reproduce well the visual effect in the photograph. For the purpose of bringing out textural quality and "modeling," a moderately soft side lighting is usually the most effective. This may easily be secured in an ordinary room by placing the subject about six to eight feet from a good-sized window upon some support that is lower than the window-sill.

The exposure should be ample for the darkest shadows or tones, but not grossly overtimed, the idea being to so adjust matters that sufficient shadow-detail will be visible in the negative by the time the high-lights have attained enough density to print well. According to my data, the average exposure by good north light indoors is two minutes with stop F/16, when using a light-yellow filter and rapid orthochromatic plate. Such an estimate, however, can be only approximate, for aside from differences in strength of lighting one must take into consideration variation in actinic character of strong colors and range of contrast in the subject. Practical experience is a good teacher, particularly if a record is kept of each exposure and the conditions under which it was made, such factors being noted as color of the flowers, strength of light, stop, plate and filter used.

PINK ROSES

Flowers of delicate tint and texture usually look their best in a glass receptacle.

The particular developing formula adopted is of little importance—any developer capable of giving good printing negatives of general subjects may be used—but it is important to avoid overdeveloping negatives of flower subjects, since any excess of density in the higher lights will give the petals either a chalky or a china-like appearance, neither of which can be considered truthful, or agreeable to the eye. Aim for softness without flatness, a happy medium that is most easily attained, and maintained, by timing development.

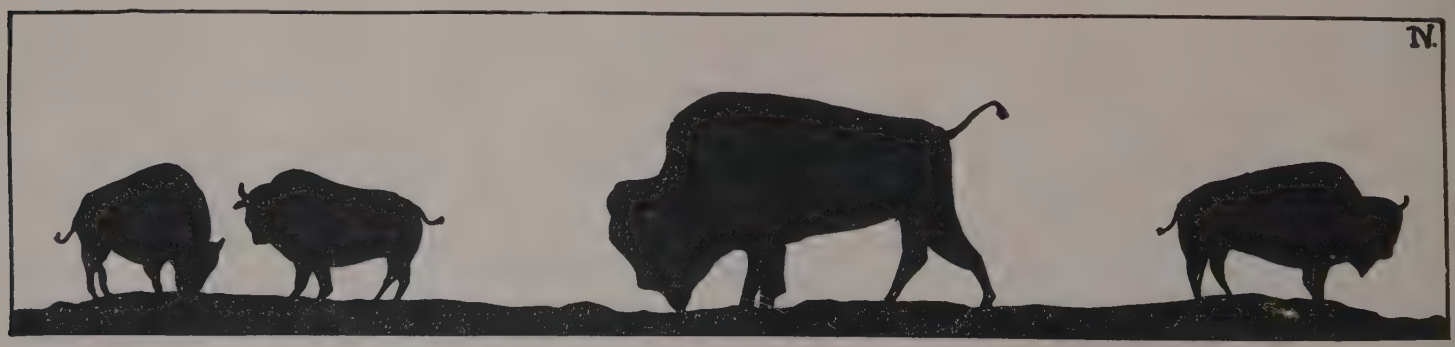
A well-made print in monochrome of a well-composed and lighted group of flowers is sufficiently beautiful from the pictorial viewpoint to need no additional work upon it, but the botanical interest of some floral studies may be increased by careful hand-coloring. Prints that are to be thus treated should be made upon a smooth or slightly rough-surface paper and kept a bit lighter and softer in tone than those that are left untinted, since the greys of the photographic image showing through the transparent washes of color reduce the purity of the latter.

Saving the Big Game of Mexico

(CONTINUED FROM PAGE 219)

boundary. A number of men were met from Ajo, Phoenix, Tucson and Yuma, without arms or ammunition, who were going to Adair Bay for fishing.

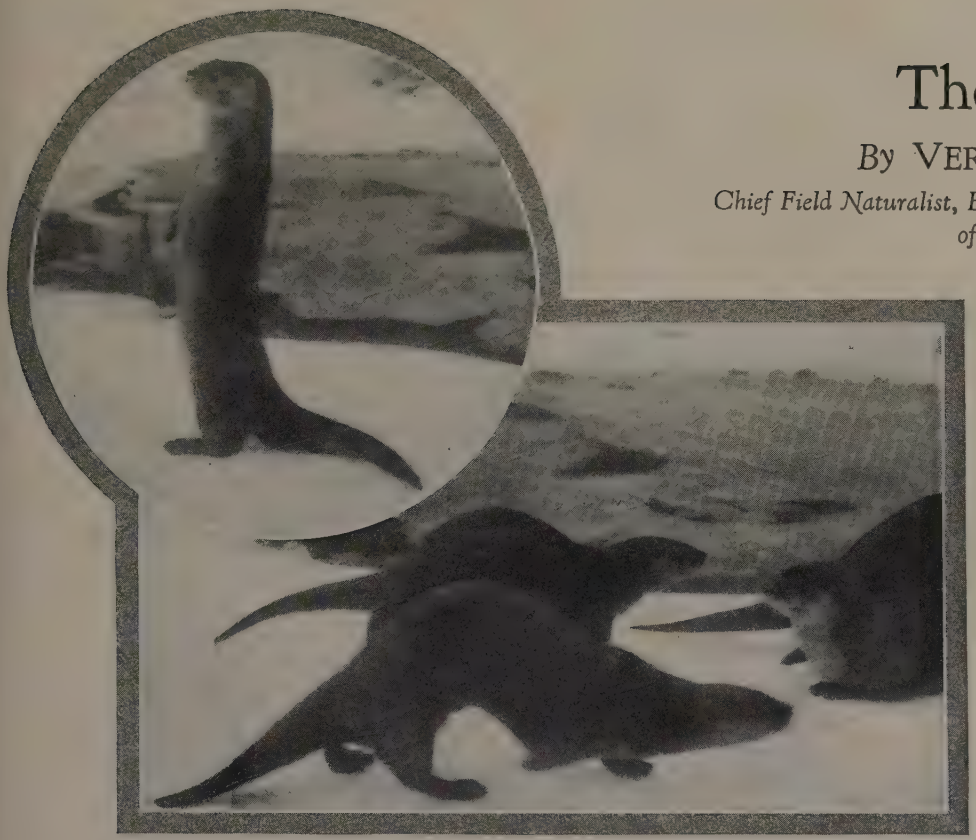
The Department of Agriculture of the Mexican Government has called the attention of the Administration of Lower California to the new laws, and issued definite instructions that no permits for hunting sheep or antelope are to be granted. This effective action now renders the protection of the sheep and antelope of Mexico effective everywhere, save in Chihuahua, and concerning the latter we are at this moment lacking information.



The Otter

By VERNON BAILEY

Chief Field Naturalist, Biological Survey, U. S. Department of Agriculture



ABOVE

THE WEASEL POSE

At a distant sound or motion, the otter straightens up for a better view and stands steadily on his broad hind feet, braced by his muscular tail, in exactly the pose a weasel so frequently assumes.

BELOW

THEIR LOPING GAIT

On land, otters have a clumsy, hump-backed lope that is neither graceful nor swift, but in the water, or when sliding on wet snow, they are both swift and graceful.

THE OTTER, big cousin of the weasel, and, next to the wolverine, the largest member of the weasel family in North America, is one of our most valuable fur-bearing animals, valuable because of its soft, warm and beautiful fur and because of its large size and wide distribution. Originally otters ranged over most of North America except in the deserts, and they are still found in reduced numbers in most of their original haunts. They are generally as common in the oldest settlements as in the least inhabited wilderness, and even now are to be found within a few miles of Washington.

Few animals with such valuable coats on their backs have been able to hold out so long and successfully against man and his destructive weapons, but otters have the advantages of high intelligence, great strength and fighting power, and a comparatively safe home in the waters. Man is their only enemy worth considering, and man without weapons is no enemy at all. An old trapper in Texas told me of once catching an otter by the tail as it swam near his boat and lifting it into the boat and trying to kill it, but a minute later he said he would have given fifty dollars, if he had had it, to part company with that otter. His legs and arms were badly bitten before he could drive it out of the boat, and he will carry the scars of the encounter to his dying day.

The dog that inadvertently attacks an otter is sure to be severely cut and slashed by the animal's keen teeth before he can escape, if he is not so unfortunate as to be drawn into the water and drowned.

In quickness and strength, as well as fearlessness, otters show their kinship to the weasels, but they seem to lack the ruthlessness and insatiable lust for blood of their little cousins. This may be due in great part to their food habits, for they feed largely upon fish, crawfish, frogs, and the smaller game of the waters. To what extent they catch waterfowl, muskrats, beaver, and such water dwellers seems not to be well known, but they will eat fresh meat and freshly killed water birds. Their excrement, scattered about open holes in the ice or along the shores, is generally composed largely of fish scales, bones, and the hard parts of crustaceans. That food is abundant and readily obtained is shown by the fact that full-grown otters are generally in good condition and often have a thin layer of fat under the skins.

They capture their prey with great skill and ease, taking fish in a fair race but probably getting more of the slower swimming species, such as suckers, than of the swift game fishes. Audubon speaks of their gathering in considerable numbers where suckers are abundant and feasting on these slow fish, but he also watched them catch other, swifter fish, with apparent ease.

There are accounts of the Old World otters be-

ing taught to catch and bring in fish for their owners, but no one seems to have educated our North American species for this purpose.

Tame otters have a pleasing, birdlike call-note which they repeat at frequent intervals, especially when hungry or excited, a pleasant *chirp, chirp,* sometimes uttered rapidly, and again only occasionally, with many variations and inflections. At times they make a sharp hiss, almost snakelike, when impatient for food, and a savage growl when quarreling or fighting. Seton records a captive otter that gave a piercing whistle, heard a mile and a half away. This would accord well with the savage scream of the mink and weasel, if magnified by the larger size of the otter.

Few animals have a more highly developed play instinct than otters, possibly because of the ease with which they make their living, and the ample time left over for exercise and recreation. Sliding down hill, on the snow or on wet and muddy banks, is a favorite pastime, repeated over and over, apparently just for pleasure, until steep banks of lakes and streams are often deeply worn with their toboggan slides. A soft snow toward spring or a sudden thaw that gives a soft, wet surface to the old snow of winter often tempts the animals to make long journeys overland to other streams, progressing in long slides on the glossy fur of their bellies, and leaving tracks that show one short jump and a long slide, two jumps and a slide, one jump and a slide, and so on as they have progressed rapidly down hills and less rapidly up grade. I have followed their fresh trails for miles on snowshoes but have never been able to overtake one.

OTTERS IN THE NATIONAL ZOOLOGICAL PARK

These four fine otters, as tame and friendly as puppies, often came to the fence and begged to be noticed by passers-by. As feeding time approached they would keep close to the fence and watch eagerly for their keeper.

AN OTTER IS A POWERFUL ANIMAL

A large male will measure about four feet in total length, and weigh 20 to 23 pounds; and a female about 19 pounds. They are heavily muscled over a strong frame and few mammals of their size are more powerful.

The brain cavity in the skull of a large otter holds 176 small white beans to 150 in a raccoon's skull of about the same size.

In the Zoological parks otters are among the most active and interesting of the animals, running and sliding on the banks or in the snow, and rolling and tumbling with each other, but most of all, diving and swimming in rapid and graceful curves and undulations. The long, muscular tails are powerful propellers, in addition to the large and fully webbed hind feet. In fact, the whole long, graceful body ripples with undulations that seem to increase their speed.

A special stunt that one of the otters is evidently proud of is to swim under water to the stone wall at one end of the pool, come up facing the wall, and with his front feet push himself over backward, then with his hind feet give a big kick and go swimming the whole length of the pool on his back, just under the surface of the water, using his hind feet and tail as propellers, then turning at right angles to the other side of the pool, and with a graceful twist of his body coming right side up again, swimming back to the starting place and doing it over and over again and again a dozen times in succession. Another stunt is to roll over and

(CONTINUED ON PAGE 252)

The Cockroach of the Ages

By CATHERINE BEACH ELY

A CERTAIN unwelcome intruder, profiting by the fad for early Persian and Egyptian motifs in sartorial styles, house decoration, newspaper headlines and department store advertisements, can point with pride to an ancestry which scientists tell us probably goes back to the earliest oriental origins. This bearer of a proud ancient lineage is no other than the cockroach.

From the Orient the cockroach crossed over into Europe about three hundred years ago. He has crawled down the ages, surviving all vicissitudes, and is just as persistent today as when he scurried about the abode of primitive man. He was originally exclusively an outdoor fellow, but centuries of civilization have thoroughly domesticated him.

The cockroach is a shifty-looking customer, entirely built for concealment and evasive purposes. A general portrait will fit almost any member of his family. He is smooth and slippery. He walks with his head so far down that it is turned back under his body, yet nothing escapes his observing eyes. His antennae are longer and thinner than a cat's whiskers. Although the male usually has two pairs of wings (a leathery outside pair and a thin slimy-looking inside pair), he doesn't fly much—he sulks. The female is wingless, semi or completely winged, according to the variety of roach. An effective part of the cockroach's anatomy is his legs—long, strong ones, admirably adapted for rapid transit and decorated with numerous bristles or spines which give the human observer the shivers. But by all odds the most formidable feature of the cockroach is his jaws, shaped for eating almost any substance, mineral, vegetable or animal. His appetite is astonishing and all-inclusive.

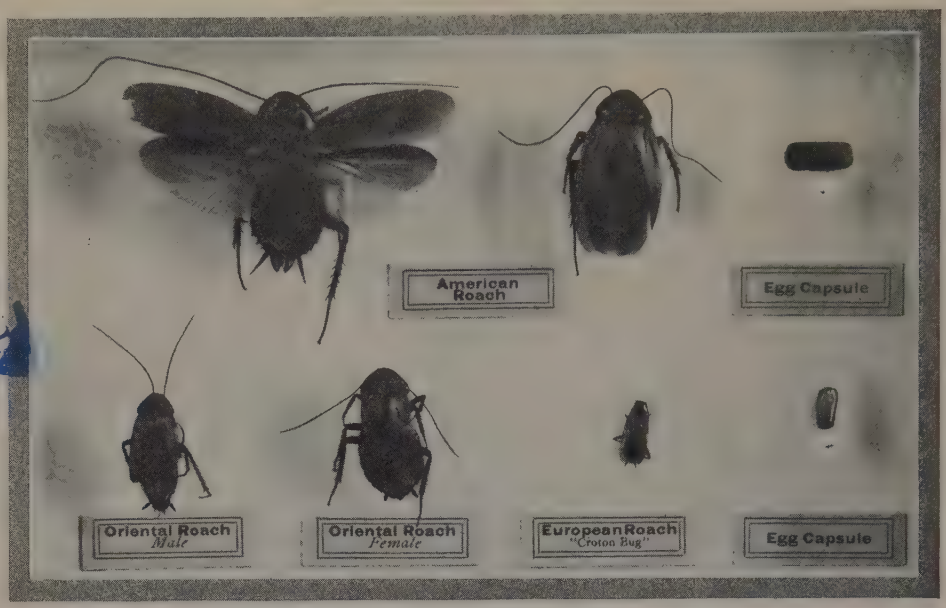
He eats food, garbage, and carrion, eats his own cast-off skin and egg cases (they say he has been known to eat the eyelashes of a sleeping child). It is rumored that he is cannibalistic toward fellow-roaches who get on his nerves. He eats shoes, furniture, woolens, plants and bookbindings. The German roach is especially highbrow, preferring books with gold lettering (though less de luxe editions will do). Large numbers of roaches are doing research work in the libraries of eastern towns and colleges, and others evidently passed the Civil Service examinations, as they are found at the Treasury and Agricultural departments of Washington, D. C. They have also gone into journalism—Archy, the cockroach, is helping a famous humorist edit his daily "Colyum." The cockroach must be something of a linguist. The early Dutch knew him as "Kakerlack," which sounds like a good name for him. In Sweden he acquired the title "Brodetare" (bread eater). The name cockroach comes from the Spanish *cucaracha.*

THE LIVELY COCKROACH

A shifty-looking customer, entirely built for concealment and evasive purposes.

The cockroach fights his own relatives, so that only one species is apt to infest a given section at the same time—there is some comfort in that. He likes places where the chewing is well saturated. He enjoys ships because they are wet (wet refers here only to atmospheric moisture), and greenhouses because they are wet and hot.

This dissolute insect has a nervous panicky walk; he belongs to the underworld and is a night-prowler, but, unlike the up-to-date human bandit, he lacks the courage of his convictions. If you will catch him at his orgies, just leave food or soiled dishes in a closed kitchen, then suddenly open the door about midnight and turn on the light; you will hear an uncanny rustling, you will see small dark objects making for every nook and cranny, and you will detect the penetrating odor which comes from an oily liquid exuding from the glands of this disgusting reveler. The roach has scarcely any enemies among other insect orders; they give him a wide berth.



HE HAS CRAWLED DOWN THE AGES

He entered Europe from the Orient three hundred years ago and is known and disliked in almost every land.

It must be admitted that the cockroach is not entirely destitute of natural feeling; the parents keep the young together. Sometimes a whole colony of young will trail along with one or two grown-up cockroaches who good-naturedly let the babies crawl all over or under them. The new-born have no wings and are white and soft. They are in no hurry to grow up, requiring nearly a year to reach maturity, sometimes (so it is said) even four or five years—it depends on how dirty, damp and warm their environment is.

The cockroach circumnavigates the globe. The German roach has made New York his own. The Australian roach is a tourist resident of Florida and other southern states. The American cockroach, originating in the tropics and subtropics, has become a middle-westerner. The oriental cockroach is crawling all over Central Europe. Of all cockroaches the German or European breed is the most insistent, rusé, the nimblest in retreat, the most omnivorous and the toughest. He is also called the "Croton bug" from the Croton water-works, upon completion of which he shipped through to New York. Although beetles and cockroaches belong to different insect orders, the oriental cockroach is inaccurately called "the black beetle" in Europe. Beetle and cockroach flappers have very much the same silhouette. Even the aristocratic scarab or sacred beetle somewhat resembles the cockroach in general appearance. Shrewdness characterizes the cockroach. He shows great intelligence in finding what he wants and getting away with it. He is wary. The accumulated wisdom of the ages warns him to avoid poison and other inhospitalities of man. Nevertheless roach powders are on the market or may be prepared at home. Sodium fluorid, borax pyrethrum, sulphur and phosphorus enter into the composition of roach powders. Or you may burn pyrethrum, which is a non-explosive, in a closed room for six or twelve hours. The French and English use more or less intricate devices for trapping roaches. The career of a successful roach-trapper ought to appeal to practical altruists.

A simple American homemade roach trap consists of tin bread pans about three inches deep. Grease bottom and sides of pans with rancid butter; place overnight where roaches are numerous. In the morning shake out roaches into hot water and re-grease for another haul. It is less picturesque then deep-sea fishing, but may bring prompter results.

The best preventive against roaches is persistent cleanliness. Roaches like dirt, stickiness, moisture, pollution and bad air. Unless you wish to make a scientific specialty of roach study, keep your rooms well aired and well dusted. Don't leave uncovered food and unwashed dishes in the kitchen, and keep the bathroom immaculate. Word will then be passed around the roach-gang that there is "nothing doing" at your number.

PHOTOGRAPH BY INTERNATIONAL NEWS REEL

THE WEIRD FACE AND HEAD OF THE JAMAICAN IGUANA

Formerly these great lizards were abundant on many islands, and were so much prized as food that shiploads of them were sent to the Carolinas from the Bahamas.

The Jamaican Iguana

By EDWARD A. PREBLE

THIS weird face does not represent the restoration of a prehistoric dinosaur but one of the Iguanas, a group of great lizards found mainly in the warmer parts of America. It is apparently *Cyclura collei* from Jamaica; the genus is confined to the Greater Antilles. The color of this species is mainly brownish-gray, relieved by blotches of straw color, and tinged with yellowish-green on the legs and face. Some of the Iguanas are much more brilliantly colored, being marked with blue, green, or yellow. They attain a length of upwards of five feet.

Iguanas were formerly common in Jamaica, but the mongoose, which was introduced there from India in 1872 to destroy the rats, performed that office so well that its rapidly increasing numbers could not exist on rats alone and were forced to live on any other animals they could overcome. As a consequence, the Iguanas shared the fate of many other native species, and are now confined to certain small islands which the mongoose could not reach.

In former times the aboriginal inhabitants within the range of the Iguanas esteemed them highly as food. Such was the case on the Bahamas, where these great lizards were so abundant in early times that ships were laden with them for transport to the Carolinas. In late years, however, the demand for animal food by the poverty-stricken inhabitants of the fair Bahamas has been so great that the

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Autumn Leaves

By ARTHUR NEWTON PACK AND ELEANOR PACK

AUTUMN is here once more, bringing with it the cool, crisp days and golden twilights. The smell of smoke drifts in at the window, and the shouts of children scuffling through the dried fallen leaves remind us that winter is near at hand and we must be preparing. But how often do we realize that the trees have been preparing since late summer and are now nearly ready to greet winter with the knowledge that they have fortified themselves in advance?

Leaves are the lungs of the trees, and through the leaves transpiration goes on, a process similar to perspiration in animals. In the winter the roots cannot gather as much moisture as in summer, and as the tree can ill afford any great loss through evaporation in the leaves it discards them, carrying on respiration through the bark alone. But the lessening of moisture in the soil is not the only factor. We often feel sorry for the snow-laden branches of the graceful birches and for the evergreen boughs weighted down by a load too great for their strength. If the leaves remained on the maples and elms about us, some snowy morning we would find the branches torn by the additional weight of the snow and ice adhering to the broad leaves.

"WHY do leaves fall? Why do the maples turn to gold and scarlet? How can evergreens keep their leaves?" The Editor set out to ask these three questions of everyone he met. He asked business men, stenographers, farmers and laborers. Some said the frost was responsible, some admitted they did not know, but everyone countered, "Well, I never thought of that, but it is interesting. Why?" At last he went home and asked his wife, and she knew. Mothers have to know things.

The trees do not cast away their leaves thoughtlessly, however, for they cannot well lose the living substance in each leaf, so in the early autumn this substance is slowly withdrawn into the branches and tree proper. A separation layer of tissue at the base of the leaf-stalk gradually forms, and as the time approaches when the leaf must fall, this tissue becomes more and more distinct and of a mucilaginous nature. The leaf is then held only by the outer skin and the woody strands which connect the wood of the twig to the veins of the leaf. Only the framework is left and the colors caused by the disintegration of the green chlorophyll. The leaf is now ready for some outside agency to step in and complete the task.

You have noticed how a warm, sunny day in October brings with it a literal shower of dancing, swirling leaves, or how a frosty morning quickly leaves a tree devoid of foliage, while during the days between scarcely a leaf detaches itself? On a warm fall day the dry air shrivels the leaf and shrinks the base, causing it to rupture and fall. The elms and the birches seem to divest themselves almost entirely on one of these days. Then some morning, when the frost has blanketed the grass in white, the leaves of the sugar maples and poplars fall soddenly and steadily to the ground. Ice crystals had formed in the sticky separation layer and, when the warmth of the sun thawed and expanded them, the woody tissue was torn and the leaf pushed free. Again a wet humid day may dissolve the tissue so that the first gust of wind sends it whirling earthward.

Some trees, such as the oaks and the beeches, retain a great many of their leaves all winter and only discard them entirely in spring. The separation layer seems to be mature in late fall, but it may well be that the layer is not quite thick enough and needs the added soaking and decay of winter to complete the process, so that March winds and April rains may carry away the last of the withered leaves. Although it is sometimes said that the extra urge of new buds is needed to push the old leaves off, a close inspection will indicate that the relative position of the buds to the old leaves does not bear out this idea. People of the northern states often envy the southerner, thinking that the latter must be lucky in not having to rake leaves from his lawn so continuously in autumn, but this is a mistake. The leaves fall every year in the south as they do in the north, choosing the dry season. If the tree held its leaves during the season of drought, the moisture loss would be more than it could endure.

The reds and golds and purples of autumn leaves are not brought about by Jack Frost as is commonly supposed, although frost sometimes does kill the leaf so that it will fall before its time, thus depriving the tree of nourishment and weakening it. Autumn coloring itself is entirely independent of the action of frost and may occur even in midsummer. As the nourishment of the leaf is withdrawn into the tree,

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AN ALMOND ORCHARD IN CALIFORNIA

The tree greatly resembles the peach. The crop is easily harvested by knocking off the nuts which fall on sheets of canvas spread on the ground.

The Almond Tree and Its Crop

By DELPHIA PHILLIPS

THE ALMOND tree very much resembles the peach tree except that it is more symmetrical in shape. To the uninitiated the nuts look like flat, malformed peaches which have failed to properly mature. With the peach, the pericarp is the part eaten; with the almond, the seed or kernel is the portion which, by cultivation, has been rendered palatable, and the pericarp is the hull.

The almond tree has some peculiar habits and whims. It seems to prefer California as its habitat, as 98 per cent of the almonds grown in America are produced in that state, and in a rather restricted territory at that. It seems to require the spots where extremes of cold and heat are present in their respective seasons, and photographs have been taken of an orchard with snow on the ground on the first of February, and again with the trees in full bloom by the 26th of the same month. Some of the trees show the loose branching habit of the peach tree, but others grow in a more vase-like form. Most of them are of the latter description.

In California, the bulk of the almond crop is grown in the region round about Banning, where there is a processing plant and packing house. The tree has this peculiarity, that the members of the same variety will not fertilize one another. Thus

if a lady papershell cannot have a hardshell for a mate, she will not produce nuts. So the grower must plant alternating rows of hardshells and papershells in order to insure a harvest. The most interesting fact of all, however, is that the nuts will come true to the kind produced by the mother tree and are not hybrids, as one might expect. This oddity of the almond results in the nuts ripening at different times in the orchard, but this is probably no inconvenience, as the grower will not be so rushed in the harvesting.

Many almonds are grafted on peach roots, but it is believed that the almond stock is hardier and less susceptible to attacks of insect pests.

GETTING THE CROP

Two men can get the nuts from a tree in a short time by using poles.

The nuts are knocked from the trees with light poles by a man who climbs into them for that purpose, and fall on sheets of canvas spread on the ground. Another man circles about the tree, knocking the nuts from the outside branches. Most of the nuts can be taken off at one operation, so it does not take as long as the harvesting of the English walnut crop. The canvases are spread on either side of the tree and are dragged from one tree to the next, on down the row.

Around Banning much of the work is done by Indians from a near-by reservation and provides work by which they procure their winter supply of food. Hand hulling is preferred, but, where there are large quantities of nuts, hulling machines are used. In Banning the Almond Association operates a huller for the benefit of the growers.

When the nuts arrive at the packing houses, they are sorted according to variety. They are then spread out thinly on wooden trays similar to those used in apricot and peach drying, and conveyed to the sulphuring chambers on low trucks, with about ten trays to the truck.

At the Banning plant the sulphuring chambers are air-tight booths made of concrete, built in one unit of ten compartments, having a processing capacity of from four to five tons at a time. Steam is first turned into the booths after the truck load of trays has been wheeled in, and is continued for a period of twenty minutes. This is to open the pores of the shells to they will take in the sulphur. About one pound of sulphur is placed in a small hearth at the back of each booth, is lighted, and the metal door closed. Another twenty minutes of the sulphur fumes and the nut processing operation is finished. The sulphuring fumigates and brightens the color of the shell.

Autumn Leaves

(CONTINUED FROM PAGE 242)

various pigments and other products of decomposition, which have until now been hidden by the green chlorophyll, show themselves. Iron and minerals which the sap has collected from the soil help contribute to the pageant of autumn colors. But why are some autumns more glorious than others, and why is the coloring less brilliant on our Pacific Coast than in eastern Canada and the northwestern states? Why are our native trees more subdued in hue when grown in the more humid climate of Europe? Moisture is the color gauge. A long, dry autumn produces the finest color carnival, and a long, dry autumn is generally characteristic of our northeastern states. Long, cold rains wash the color and wilt the leaves, while a sharp freeze before the leaves expect it may catch them unawares and kill them before they have had a chance to display their beauties.

For you who go out into the woods in autumn and gather boughs to take home, be careful and pick only those which you recognize. The poison ivy and the poison oak are among the most beautiful, and the former often climbs so densely up the trunk of a neighboring tree that its leaves appear to be the foliage of the tree rather than the vine. Sometimes even school teachers have unwittingly brought

(CONTINUED ON PAGE 251)

The Teacher and the Camps

Through interesting children in the study of the birds and trees and flowers, the teacher is doing an important work in making the child more fit to get much out of his camping experience. It is hard for a teacher to realize how important her influence is in this respect. A teacher in a great city whose pupils are largely foreigners and come from poor homes, was delighted this summer to receive the following letter from one of her boys:

"Dear Miss ———:

"We are having a good time in camp. We got a nature club, like you showed us how. Thomas is our president. I am secretary. We got lots of pets. We tell the other kids about things. Tom's got four turtles, Celeste has got a crow, and I got a little snake. We are saving things for you. Mr. C. says you must be a good teacher and all us kids send kind regards.

"E.— W.—."

Some teachers would have been distressed at the grammar of this communication; but this one, being of the "born" kind, was able to read beyond the fog of faulty verbs and tenses into the sunlight of the child's mind and soul.

Grammar too often places bars of iron between the understanding of the teacher and the soul of the child.

Butterflies in a City School

A teacher in one of the public schools of Manhattan is keenly interested in natural history, and is especially interested in birds and insects. She has made a collection of butterflies, mounted in glass frames, and these she carries to her school to interest her children in these beautiful insects. During the past year her problem was a peculiar one, as her work was in fourth grade, but with backward and defective pupils; her method of teaching them to observe butterflies closely was as follows: She drew on the board the outline of half of the butterfly to be studied. The children copied this on folded paper and then cut out the pattern, unfolded it and traced it upon a fresh sheet of paper. Thus they had their outline. Then the teacher indicated the veins and markings and placed the butterflies themselves where the children could observe while they made their colored pictures. Colored crayons were used, and the results were surprisingly good. Each pupil made in this way a picture of the black and the tiger swallow-tails, the monarch and the roadside butterflies. The pictures were put up around the room and were the source of great interest and delight to other pupils in the school.

The Born Teacher

Here and there are found rare people whom nature from the first equipped with the temperament, the tastes, and the genius which characterize the finest flower of the teaching profession. Most of us have met such and have marveled at their power, and have paid admiring tribute to their influence and achievements. It is difficult to analyze their characteristics because in each case the personality was the menstruum in which all the qualities were dissolved and recrystallized into a whole that is not to be classified. However, it is safe to say that a love for the knowledge to be imparted, joy and fervor in imparting it, sympathetic outreach into the minds and personalities of the pupils, and a heaven-bestowed patience, are the fundamental attributes of the born teacher.

Not all good teachers are so born; they must possess one or more of the fundamental attributes, and must develop more or less of the others, in order to be able to accomplish a noble and far-reaching work as educators.

There is one quality that always marks the thoroughly alive teacher, whether the same be born or made, and that is the ability to meet every new idea or phase of education alertly and with open mind that at once foresees how it can be used to help in teaching—an ability to place a subject or a method where it will prove most efficient and do the most good. Probably the greatest impediment to our educational progress, as a whole, is the teacher who cannot change, cannot assimilate or use new ideas—a teacher who works in a rut, cutting deeper and deeper each year, until his or her work is done in a narrow chasm with precipitous walls on either side and a mere strip of blue sky above. Unfortunately, school superintendents too often find the teachers in ruts easier to manage, and so give them preference, thus increasing a kind of education that is practically archaic. It is our belief that the best school superintendents are also born to the work; such are possessed of true vision as to the scope and greatness of their work; such would never settle down in ruts themselves and become mere mechanical directors of mechanical instruction, with a clamp on their minds which nothing in God's wonderful world is able to pry open.

If we speak feelingly, it is because we have had a long experience in teaching teachers, and in dealing with school superintendents. We rejoice to say that we have found a great many able, alert teachers who have taken the nature study idea and have molded it to fit their work. We have also found many enterprising and keen superintendents who are able quickly to discriminate between fads and new movements of fundamental value in education. We have also had plentiful experience with teachers up to their eyes in ruts and with fossil superintendents firmly embedded in pedagogical strata of a former age. However, these latter do not discourage us, because all history tells us that it is only the educator of vision that is the leader for the future. For a long time we have been in close touch with superb teachers, both the born and the developed kind, and hope to give accounts of their work in the field of nature study in Nature Magazine.

Hints to Teachers on Nature Subjects

By ELIZABETH K. PEEPLES
Instructor of Natural History, Washington, D. C.

Each month Mrs. Peeples will, in this Department, briefly discuss the articles in the magazine and give helpful hints to teachers of nature subjects on how to present the features of each article to their classes.

Hail and Its Half-Brothers There are forms of Nature Study material which will not keep, but must be used on the instant of their appearance. Such are snowflakes and hail. If the teacher is wise, she will plan lessons on these topics in advance and take the first opportunity to teach them from "live material." The difference between "true hail" and its "half-brothers"; the way in which hail is formed; the damage done by it, and the only effective protection against it will interest children of fifth-grade age or older. Put NATURE MAGAZINE where you can find it at a moment's notice, as you will want to show the pictures.

* * *

Bob White! Bob White!! Bob White!!! Bob White, of all the feathered folk, seems preeminently fitted to awaken in children the sympathy and affection for creatures unlike, yet so like, ourselves, which is the first goal of Nature teaching. Where would you go for a better "human-interest story" than that of his courtship, his home-making, his family cares, and finally the life of the covey? Your class will probably be able to give you part of it from their own experience. The remainder you may supply from yours, and from the complete and entertaining account of this little neighbor given in Mr. Lippincott's article. Be sure that the children get the anecdotes of the closing paragraphs. They love such stories, and acquire through them a much more personal feeling toward the creatures about which they are told than through mere generalities. It is well to emphasize the value of the quail as a destroyer of weed seeds, his need for protection, and the fact that today the common cat is his worst enemy. You will find the illustrations pleasing and helpful.

* * *

Saving the Big Game of Mexico Next to character building the conservation of natural resources and wild life is the most vital lesson to be taught the citizen of today or tomorrow. Mr. Hornaday's account of how the mountain-sheep and prong-horned antelope of Mexico were saved from what seemed in 1922 inevitable destruction at the hands of American sportsmen and Mexican meat hunters is a live story of practical conservation which makes good reading and should be discussed by the pupils of all grades. It has a flavor of geography as well as natural history and conservation.

* * *

The Evening Skies in October Nothing in Nature Study is more delightful than the study of the stars. Let the class locate the chief objects of interest in the sky upon the sky map. A large copy may be placed on the board—smaller copies in the children's notebooks. As few or as many stars and constellations should be taught at one time as the age of the pupils and their previous experience make advisable. The chief responsibility lies in arousing enough interest to insure that this preparatory study will be followed by actual star gazing. A star party of half an hour held early in the evening in the school playground or other convenient place is very helpful. The article presents many facts of interest, as well as some of the star myths which children find as fascinating as fairy tales.

* * *

Nils Carlson, Forester If the teacher were asked, "What are the two lessons of most importance which you teach your children?" she would doubtless answer, "Character building and the conservation of our natural resources." Yet staunch as she may be in her belief in the answer, she may sometimes grow weary in well-doing. For such moments a story like "Nils Carlson, Forester" is a tonic. It tells the work of Swedish schools in teaching conservation, reminding us by the contrast which we ourselves draw, of the need for similar teaching in America. Read it to renew the determination that the class shall be given the out-of-doors, and the love of it, to the utmost. Read it to refresh ambition to interest definitely at least some of the boys every year in the profession of forestry. Read it and take as one aim for this school year to plant a tree in the hearts of the pupils.

* * *

The Cardinal Flower One cannot question the need for teaching the wild flowers when the teacher finds one so startlingly beautiful as the cardinal flower, unknown to many children. But she will not wish to stop with mere identification. It is even more important that the rising generation learn to show its appreciation of beauty fittingly. That conspicuous color and rare beauty should contribute to the destruction of a bird or flower is a sad commentary upon our intelligence as a nation.

* * *

Gold That Grows Whether or not we like to admit it, appreciation of Nature's gifts is increased in a material age and a land not unmindful of money, by a suggestion of their value in dollars and cents. School pupils may see more in corn than they have ever seen before when they learn that it annually produces greater wealth than all the gold mined. If they list the various uses of corn known to them, and any additional ones described in "Gold That Grows," they will understand the reason for the size of the crop and its enormous value. The plant makes an ideal study for little folks. For older pupils there may be added the many varieties, the distribution of the plant over the world, and the part it has played in man's history. All this and more, with pictures which take one "back to the farm," are given in the article.

* * *

The Texas Bird of Paradise Another delightful bird story with pictures which bring this Texas avis into any state in the Union! Bird lessons are doubtless popular both with you and your

children. You will find that the pelican, the flamingo, Bob White, and the scissors-tail fly-catcher offer a variety and wealth of detail which would be difficult to surpass in selecting four birds for study. Charming as is the author's account of her intimacy with the fly-catchers who built within fifteen feet of her door, it is wiser not to recount to your class the adventure of "lowering the nest to make photographs," and "returning nest and nestlings to the treetops." There are rare individuals who by long experience, or some special gift, may presume to take such liberties with their bird friends without danger of disturbing them: but the slightest suggestion which might start experiments in this line on the part of children would be a mistake.

* * *

The Chigger or Harvest Mite Chiggers are scarcely the sort of live material you would care to bring into your schoolroom for study; and it is to be hoped that no outdoor lesson may lead to the unwitting acquisition of a supply. On the other hand a lesson based on the pictures and text of this article would be valuable to any class. This troublesome mite presents an interesting life cycle. Strangely enough the food habit, which when perverted makes it such a dreaded annoyance in its infancy, places it on the list of beneficial insects in its adult stage. Youngsters knowing when and where the danger of attack is greatest, and the best means of preventing it, may be saved much real suffering.

* * *

Arrangement and Photography of Cut-flowers Here is something that will interest you and your pupils as well. Almost every class bring flowers to teacher, yet how much more attractive some schoolrooms are than others. Perhaps a part of the secret lies in the treatment of these floral offerings. Effective color combination, selection of suitable flower-holders, grouping, placing, and lighting of flowers are means of making the most of their beauty. Suggestions in regard to these matters are given in the text, and in pictures as well. Junior high school students might make much of flower photography as a part of their General Science course.

* * *

The Otter Interest in animals is so natural with children that it is usually a simple matter to teach love and sympathy for them even where it does not already exist. In presenting an animal that is "new" you have splendid opportunity to train powers of observation, and to supply your class with a mine of material which they will work enthusiastically. The otter as a fur-bearer, as the courageous protector of his life and liberty, as a fisherman, and as a special stunt artist is bound to delight children. Take them to see live otters if possible. Use the pictures which illustrate this otter story, too.

* * *

The Cockroach of the Ages If you are looking for a practical and profitable outlet for the surplus energy your class has stored during the summer vacation, why not launch a campaign against cockroaches? Unfortunately they, like the poor, are always with us. It will not be necessary to wait for any special outbreak to begin study and start the project. Known since the days of primitive man, these slippery night-prowlers have crawled into every land. The universal dislike felt for them is due not only to their disgusting odor, ugliness, and filth, but to their omnivorous food habits which make them one of our most destructive insect enemies. Roach powders and traps help in clearing infested quarters; but the best preventive is scrupulous and persistent cleanliness. Thus by the law of compensation, you have an opportunity to teach the most attractive and essential habit in connection with an otherwise unattractive subject.

* * *

Autumn Leaves A teacher of general science will find autumn leaves a topic of rare possibilities. Throughout the greater part of the United States they constitute a part of the pupil's environment at this season. In the autumn leaf is opportunity to teach botany, physics, and chemistry, as those individual sciences enter into leaf structure and function; the withdrawal of the living substance of the leaf into the tree, autumn coloring, and the fall of the leaf. The contrast of the evergreens' preparation for winter with that made by deciduous trees adds interest. The formation, constituents, and special values of leaf mold round out the topic. A timely suggestion for all who gather autumn leaves, either for purposes of study or decoration, is that they beware of poison ivy and poison oak, two of the most beautiful of all the gorgeous company.

* * *

The Almond Tree With peaches still in season, their close relatives, the almonds, may be gracefully introduced anywhere, though almond trees are hard to find outside of California. To trace the family resemblance in these seemingly unlike fruits is a bit of botanizing which your class will enjoy. If you have taught cross-fertilization with flowers of any kind, the peculiarity of the almond blossoms in their choice of pollen is an additional fact of rare interest for your pupils. A copy of NATURE MAGAZINE in the schoolroom makes it a simple matter to ask your class to report either orally or in writing on the work done in preparing the almond crop for market.

Inspiration from a Study of Nature

"One impulse from a vernal wood may teach you more of man, of moral, evil, and of good than all the sages can." To this statement of Wordsworth most will agree, but few there are that get the impulse. Many visitors to our National Parks search for amusement or at best for scenery and are blind to all living things about them; they hear jazz and perhaps the thunder of waterfalls but are deaf to the finer sounds of nature. The nature guides in the Yosemite teach visitors "to read nature as a book," a basic preparation for securing the impulse mentioned in the quotation above.

Important Discovery Made

Succor for the trailing arbutus, endangered by indiscriminate gathering, and strength for the rhododendron are promised as the result of a discovery made by Dr. Edgar T. Wherry, senior chemist of the Department of Agriculture. The discovery is regarded as one of the most important additions to plant knowledge in recent years and consists of chemicalizing alkaline soil to produce sufficient acidity of soil to grow these two types of plant life. Dr. Wherry, who is a member of the Scientific Consulting Board of NATURE MAGAZINE, was assisted in this work by Frederick V. Coville, botanist of the department.

Georgia Joins the Ranks

In Georgia a new law has just gone into effect providing taxation adjustment to encourage the reforestation of timberland. This law follows the general idea of the Louisiana law, providing that the land owner may enter into contract with the State Board of Forestry to have a low assessed value set on his land that is growing second growth timber for a period of from 15 to 40 years. The grown timber is subject to a yield tax at the time of cutting.

Trees and Congress

"Shall the trees save Congress or Congress save the trees?" is the title of an excellent article by Lawrence F. Abbott in a recent edition of the *Outlook*. In commenting upon the speech by the Honorable Martin L. Davey of Ohio in the House of Representatives, Mr. Abbott clearly brings out that forest conservation, like a declaration of war, is neither a Democratic nor a Republican problem. It is one for the Government of our country. He concludes with this observation: "We shall almost have reached the millennium when we elect men to Congress who are experts on at least one subject and when the welfare of human beings is considered with as much wisdom and as little partisan prejudice as the welfare of trees and birds."

Dr. Drinker Honored

Members of the State Conservation Council of Pennsylvania, which is bringing together many state-wide and local conservation organizations of different types, have chosen Dr. Henry S. Drinker, president emeritus of Lehigh University, and long active in forestry, as their president. He will lead them in the work of securing conservation legislation in Pennsylvania.

New Redwood Memorial

Five million feet of stately and towering redwoods, covering 195 acres of Humboldt County, California, have been dedicated as a memorial to Franklin K. Lane, late Secretary of the Interior, apostle of the out-of-doors and lover of Nature and her gifts to mankind. The Franklin K. Lane Memorial Grove is on the Redwood Highway. It was purchased from funds contributed by friends of the late Secretary and through the Save the Redwoods League, and is incorporated in the Humboldt State Redwood Park. More than 6,000 acres of these glorious giants of the forest have now been preserved through the activities of the league.

A Confiding Flicker

Last June a red-shafted flicker drilled its nesting cavity in a support of a porch of old Faithful Inn in the Yellowstone. In passing in and out the hole on its mission of feeding the young, the old flicker attracted much attention from tourists. However, the bird seemed fully to realize the friendly nature of this interest. Even when the circle of onlookers was largest and its curiosity most pressing, the devoted flicker continued her frequent visits without the slightest pause or sign of fear. The red-shafted flicker is closely related to the yellow-shafted flicker or golden-winged woodpecker of the eastern states. Owing to a special fondness for ants and ants' eggs, these woodpeckers are more given to alighting on the ground than the other members of the family.

New Experiment Station

Thornton T. Munger, sylviculturist of the United States Forest Service, has been appointed director of the new forest experiment station for the Pacific Northwest. This station was made possible by an appropriation of $25,000 by the present Congress. Its field of work will be Oregon, Washington and Alaska, and its staff, which includes Leo A. Isaac, R. E. McArdle and Gael Simpson, will spend most of their time wresting facts from the forests of this section.

Shaggy-mane Mushroom

Through an error in transcription, which was overlooked in reading copy, the legend accompanying an illustration of the Shaggy-mane Mushroom (Coprinus comatus), on page 144 of our September issue, stated erroneously that this species must not be eaten. It has been a source of some gratification to note the number of protests that promptly came from readers whose experience with this really excellent species have been invariably of a pleasant nature.

A New Peace Plan

Few of the many tourists who visit Fort Ticonderoga during the summer gave more than a passing glance to a pair of crested flycatchers which sat at the very entrance to the Place des Armes, the gateway to the barracks and museum. But one who watched closely during the middle of July observed one of the birds suddenly disappear into the mouth of a bronze cannon, made in 1702 by the French. About two feet back from the mouth the cannon had been lined with grass, and there a family of four young flycatchers was to be seen. Books on ornithology state that crested flycatchers build nests in holes of dead limbs, but none seem to mention the mouths of cannons.

A Christmas Quarantine

Because of the bad habits of the gipsy moth, which has been active in northern Vermont and may by now have invaded Canada, the United States Secretary of Agriculture has ordered a quarantine against the importation of Christmas trees and decorative Christmas greens, such as laurel and holly, from various sections of the Province of Quebec. The order became effective on July 1, 1924.

Training Nature Guides

To many citizens the Yosemite Nature Guide Service has already become known as "Yosemite's Trail School." With the splendid possibilities presented by the new building and its facilities, it becomes apparent that the "Trail School" will become a substantial institution with wide recognition. There are scientists and educators now on the staff who are recognized as leaders in their profession. They are pioneers in the nature guide movement. With Municipal Camps, Boy Scout Organizations, Camp Fire Girls, Girls' Reserves, City School Systems, Chambers of Commerce, Civic Clubs, etc., calling for qualified nature guides, it is a satisfaction to know that Yosemite, the origin of American nature guides, may become the training school for leaders in the nature guide movement, which is steadily gaining impetus. Plans looking toward the establishment of a permanent Nature Guide Training School are now being formulated by the Yosemite Nature Guide Service.

Bear Tree Tag

A favorite game with the bear cubs of the Yellowstone is a kind of tag which consists of one cub chasing another up a tree. The pursued always tries to gain a strong horizontal branch from which he can reach a forepaw well down and so protect himself by cuffing his pursuer. During this particular game the mother bear usually remains near the base of the tree, looking about rather languidly from time to time and occasionally turning her head up toward the cubs, who make a great racket by racing up and about the trunk and breaking off dead branches. But these glances of the old bear are marked by the same noncommittal and inscrutable expression which only a bear has in all its perfection and aggravation.

New Hampshire Meeting

Forest problems in local and national phases were discussed at the annual meeting of the Society for Protection of New Hampshire Forests, September 1 to 3, at the Sargent Camp near Peterboro, New Hampshire. Particular attention was given to the town forest movement and its relation to recreation and education, as well as supplying timber and cordwood. The conference pledged itself to active support of the task of securing appropriations under the McNary-Clarke bill. Allen Hollis, of Concord, New Hampshire, was reelected president of the society for the coming year.

Down But Never Out

"A man may be down but he's never out," says the Salvation Army, and broadens its conviction to cover the members of the forest world by enlisting the cooperation of the Lake States Forest Experiment Station and the Society of American Foresters. The St. Paul commandery has about 53 acres of wooded land that it uses as a fresh air camp. Recently the experiment station was asked to look this over with a view to preserving its recreational value as well as its forest value. The trees were found in poor physical condition and new trees were planted by the members of the Society of American Foresters, while the sick trees were placed under a recuperative regime.

A Forest Tax Idea

Taxation law adjustment is recognized as an essential in encouraging the growth of new forests in bulk. California tried such adjustment but ran into a snag of unconstitutionality. Now an amendment to the state constitution is proposed that will overcome this barrier. It provides that "fruit- and nut-bearing trees under the age of four years from the time of planting in orchard form, and grapevines under the age of three years from the time of planting in vineyard form, and young forest growth managed in accordance with the statutes enacted by the state legislature, shall be exempt from taxation, and nothing in this article shall be construed as subjecting such fruit- and nut-bearing trees, grape-vines and immature forest growth to taxation." This is a suggestion for other states with the constitutional problem.

Perhaps Blood Will Tell

Seedlings of Scotch Pine grown from seeds gathered near Riga on the Baltic Sea and others grown from seeds gathered in Austria are now engaged in a contest on the Mount Toby College Forest at Amherst, Massachusetts. A planting has been made by the North Eastern Forest Experiment Station to see what effect the early environment of these seeds will have on the growth of the trees. Bets are being placed on the Baltic seeds to produce clearer and straighter timber.

New Museum for Yosemite

The Laura Spellman Rockefeller Memorial Foundation has donated $75,500 for the construction, equipment, and maintenance of a museum in Yosemite. The valuable collections exhibited in the present building will be viewed by 1925 visitors in an adequate, fireproof building. A lecture room in the new structure will provide seating capacity for the crowds that gather to hear the non-technical lectures on the "Story of Yosemite." In addition to these popular geology talks, the Nature Guide Service will schedule lectures on other phases of Yosemite natural history. These museum lectures will not replace the present campfire talks and lectures given at the resorts, but will add to the lecture program as scheduled at the present time.

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New Yellowstone Hot Springs

Two new hot springs on Hymen Terrace, Mammoth Hot Springs, were discovered early in July, at which time the only indication of the new activity was a small amount of steam issuing from each, while the crust about the vents seemed especially thin and breakable. They have since been increasing slowly in activity.

Ranger Bill Speaks

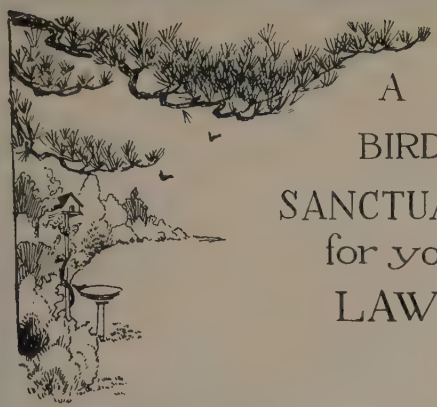
"Be sure your camp fire is dead—then bury it." This is the advice of Ranger Bill, who has climbed to fictional fame by virtue of the public relations department of the California District of the United States Forest Service. Bill says common, ordinary coffee grounds cause more fires than most anything else in the National Forests. He proceeds to prove it by telling about the camper who is too lazy to go to the creek for water and satisfies himself he has taken care of his fire by emptying the coffee pot over it. And then, says Bill, "it's mostly a race between the morning breeze and Buck and me to see who'll get to the fire first."

Placing the Guilt

Squirrels and porcupines have been accused of girdling young trees in the intermountain section of the United States. To place the blame where it should be, a half acre of young trees have been set aside by the Southwestern Forest Experiment Station at Flagstaff, Arizona, and inclosed to keep squirrels and porcupines inside. In this area Dr. Walter P. Taylor, of the Biological Survey, invites the rodents to eat and make merry, if such is their normal practice, and let him find out which one of them accounts for a high mortality rate among seedlings, saplings and half-grown trees.

Trees as Protectors

Minnesota is a level state in the main. For miles fertile fields stretch away. Yet they boast an interesting feature in the form of tree growth. Dotted here and there, a mile or more apart, are groups of farm buildings, the white house and the red barns and sheds. Around each group stands a semi-circle, with its curve toward the north, of sheltering trees, close planted and embracing. When the winter winds sweep down these trees stand there to meet them and break their chill force.



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Autumn Leaves

(CONTINUED FROM PAGE 244)

beautiful scarlet boughs of poison ivy to school for their pupils to admire or paint.

Our evergreen trees prepare for winter, too, but do not follow the example of their deciduous neighbors. Their leaves are waxy-coated and slender so that the snow and ice will slip between them, and comparatively little surface is exposed to the wind. Thus they are well equipped to withstand the winter storms. Many of us have listened to the breeze in a grove of pines soughing through the needles and loved to hear its restful whispering. But compare this with the more brittle rustling of the wind in the maples and elms and poplars as the leaves are whipped about. We realize then that the pines can far better weather the cold north winds than the trees with larger leaves. The tiny needles of the evergreens have a different appearance in winter and are darker and more shrivelled. The chlorophyll granules have withdrawn from the surface as far as possible, and the water content is greatly reduced. In this condition the alternate freezing and thawing of winter days seem to do no harm, and the leaves are ready in the spring to resume their work of starch-making. But even evergreen needles do not live long. They die and drop as new ones come, and the average tree has its needles replaced in from three to five years. So gradual is this process, however, that the tree always appears to be well clothed.

The leaves are not through with their work when they have fallen, for in the woods where man does not industriously rake them up they form a protective blanket for the roots, and then, when spring rains freshen the woods, the mineral substance is leached out and added to the soil, enriching it and forming what is known and prized as humus. Thus the casting off of the old leaves is the method by which the tree prepares the way for the sprouting of its seeds and supplies nourishment for their future growth.

The Jamaican Iguana

(CONTINUED FROM PAGE 241)

Iguanas have been practically exterminated and bid fair to be remembered only from the place names impressed by their former abundance. In other places, such as Cuba, the growing scarcity of the lizards and the changing habits of the natives have caused them to be regarded with distaste, or even dread.

In their days of abundance Iguanas were easily captured by slipping a noose over their heads as they basked in the sunshine. Sometimes they were hunted by means of dogs trained for the purpose. Nowadays, however, they must be shot or snared at the mouths of their rocky retreats. Despite their former abundance their habits are but little known. They are mainly or entirely vegetarians.

Brand's Peonies

Acres of Beautiful Blooms

The above view of one of the Brand Peony Farms was taken the last week in June, 1924, a week after the National Peony Show at Des Moines, Iowa.

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The Recreation Conference

The National Conference on Outdoor Recreation has just issued its first bulletin of facts and progress, summarizing various interesting data on the existing situation. It is found, for example, that there are seventeen different government bureaux whose administrative activities bear in some important way upon the broad scope of the conference. There are 128 different organizations of national scope active in one phase or another of outdoor work.

This bulletin states the view of the conference in the following definite terms: "Outdoor recreation is not merely a field of sports and games but, rather, a broad and vitally important social influence in which subjects such as child welfare, public health, citizenship values, physical education and nature study, rural and industrial progress, and other allied phases interlock and rank coordinately with the more commonly accepted phases such as wild life administration, land management and outdoor sports."

A tentative form of by-laws for the conference have been drawn up and are submitted to the cooperating organizations for their consideration. The Advisory Council of one hundred is expected to meet sometime in October, at which time reports of special committees will be considered and the draft of a program made up by the Executive Committee of eleven will be passed upon. According to present plans it is not proposed that the second large meeting of the Conference will be held until next May.

The Otter

(CONTINUED FROM PAGE 237)

over in a beautiful spiral, while swimming rapidly near the surface.

One day a large snowball was thrown into their pool, and one of the otters tried to take it in his mouth, but it was too large, so he pushed it with his nose, swimming rapidly to shore, and then nosed it up the steep bank and out on the level snow. Another was thrown in and he skilfully nosed it to shore in the same way; then he went back and found a stone on the bottom of the pond and brought it up in his mouth and laid it beside the two snowballs.

Another time, when a snowball was thrown into the water, an otter tried to take it in his mouth, but finding it was too large took it in both hands and, rolling over on his back, held it between his hands on his breast and played with it until it was worn out.

Two to four young are raised at a time and cared for by the mother until well-grown otters, but so little is known of their breeding habits and social customs that they are rarely raised in captivity. A close study of habits may yet show that otters can be successfully raised in domestication for fur, where a suitable food supply is available. If so, a valuable addition to our fur supply will be acquired.

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Atlantic City Congress

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The Texas Bird of Paradise

(CONTINUED FROM PAGE 231)

ground, and I seated in plain view only three or four feet away, than the parents resume their business of feeding their offspring, paying but little attention to my presence. Frequently after the food has been deposited in their greedy little mouths, the parent sits on the edge of the nest, turning her head this way and that, as if studying and admiring her babies.

Only unfavorable weather conditions and lack of experience in making flight pictures prevented me from getting some rare views of the parent birds in exquisite poses. All things considered, however, hours and hours of patient effort upon succeeding days brought forth fair results. When I had finished my labors, which I had to do because the youngsters were no longer willing to stay in the nest, I returned nest and nestlings to the treetops. It was only a day or two, though, before they left the parental roof, but were not yet quite ready to break home ties.

As I write I see from my window the adoring parents following the youngsters about and still feeding them. When they make their short flight, although their own little tails are beginning to be quite conspicuously forked and of a length to suggest competency to go on their own, they are flanked on either side by a proud but anxious parent, who keeps up a continual hip-se-dee by way of expressing joy in their achievement.

The bird is an aggressive fighter of enemies to its young and seems to have no fear of the most formidable-looking hawk or other predatory bird. Let a Great-tailed Grackle, a bird five times its size and equipped with a beak ten times stronger, appear near its nesting place and it pounces upon him at once, not stopping its pursuit until the Grackle is entirely out of sight.

Now that the youngsters are about ready to dispense with parental care I am waiting anxiously to see if I am to be favored with another brood reared at my door.

Evening Skies in October

(CONTINUED FROM PAGE 220)

heavens with a fieldglass now and then and explore some of these brighter fields of the Milky Way. It is surprising how many wonders and curiosities of the heavens we will come upon in this way. Even the familiar moon takes on a new and interesting aspect when viewed with a good fieldglass, and we have no trouble in identifying its largest craters, mountains and seas with this modest optical aid.

Mars is the only one of the bright planets now visible in the evening. Venus is a glorious object in the eastern sky before sunrise, but Saturn and Jupiter are too close to the sun to be seen this month.

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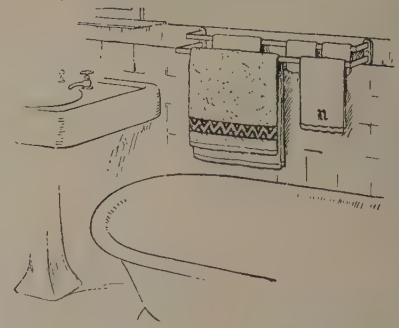

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The Cardinal Flower

(CONTINUED FROM PAGE 224)

that excites our admiration most.

The cardinal flower, *Lobelia Cardinalis,* is a member of a large family since there are over two hundred known species of Lobelia, about twenty-five of which are native Americans. The most familiar relative is Indian tobacco, *Lobelia inflata,* frequently met in open fields, and possessed of medicinal value when correctly used in the treatment of laryngitis and spasmodic asthma. The drug known as lobelia is obtained from this species, overdoses of which are so dangerous that a number of fatal results have been recorded from this cause. So powerful is this drug that it has figured in more than one murder trial. As a matter of fact, even the handsome *Lobelia cardinalis* has been reported as poisonous.

One of the finest of the wild lobelias is the great blue lobelia, *Lobelia syphilitica,* said to have been used by the American Indians in treatment of disease. This species is found throughout the area east of the Mississippi River and, like its more handsome relative, the cardinal flower, prefers a wet habitat. On the other hand, the spiked lobelia, *Lobelia spicata,* a pale, white-flowered species, prefers prairies or dry, sandy soil. Among the cultivated relatives may be mentioned the spreading little *Lobelia erinus* of conservatories and a favorite for garden borders. Both the cardinal flower and the great blue lobelia are hardy and popular garden plants that can either be grown from seed or transplanted from the wild.

The Chigger or Harvest Mite

(CONTINUED FROM PAGE 232)

generally. They are not insects but belong to the great class Arachnida, which includes the spiders and scorpions. In the adult state these commonly have eight legs. Harvest mites in the larval state, in common with some other groups, have only six legs, like insects.

The North American species belongs to the genus *Trombidium,* represented by about ten species. These occur from the southern states north to New Jersey, Pennsylvania, Ohio, Indiana, Wisconsin, and southern Minnesota, and west to Iowa, Kansas, Oklahoma, Texas, and parts of New Mexico and Arizona. One or two of the southwestern species are upwards of half an inch in length, but our common species, and those most troublesome, are so small as to be visible to the naked eye only under the most favorable conditions.

The adult mite is a tiny tick-like creature which goes about preying on such insects as it can attach itself to, sucking the juices from their bodies and of course destroying them. Some feed on plant lice and young caterpillars, and one species destroys the eggs of grasshoppers in large numbers.

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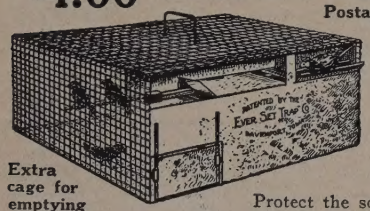

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Lions of the Sea

(CONTINUED FROM PAGE 207)

Francisco and further south complained that the sea lions were destroying fish, and a systematic campaign was started to kill them. The late Prof. L. L. Dyche examined the stomachs of twenty sea lions washed up on the shore in the vicinity of Monterey Bay. He also examined the stomachs of five more which he killed for museum purposes. Not one of the twenty-five stomachs contained any portion of a scaled fish. The lions had eaten squids and devil fish (Octopus), both of which are considered detrimental to commercial fishing. In fact, over eleven hundred squids were found in these stomachs. The California sea lion, therefore, rendered a service instead of being detrimental.

The United States Fish Commission conducted an investigation of the food habits of the sea lions of the Pacific coast in 1901. Of thirteen Steller sea lions examined, some had eaten fish, but the stomach contents showed that not a single shad or salmon had been destroyed.

These lions of the sea form an interesting gap between the typical land mammals and the real aquatic creatures like the whales. They are known as pinnipeds, which means they have feet like fins or flippers. Along the Pacific coast they are a unique part of the weird, prehistoric-like life of the sea cliffs and caverns. Unless it can be shown that they are a real detriment to commercial fishing, should not the remaining colonies be protected as a part of our great museum of the out-of-doors?

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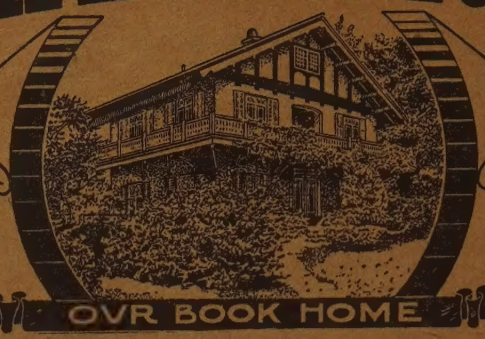

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